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A

BIOGRAPHICAL DIRECTORY

OF AMERICAN

AGRICULTURAL SCIENTISTS

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A

BIOGRAPHICAL DIRECTORY

OF

AMERICAN AGRICULTURAL SCIENTISTS.

EDITED BY

CHARLES S. PLUMB,

EDITOR AGRICULTURAL SCIENCE ;

*Professor of Agriculture in the University of Tennessee and State Agricultural
and Mechanical College ; and Assistant Director of the Tennessee
Agricultural Experiment Station.*

KNOXVILLE, TENNESSEE,
1889.

Press of W. F. Humphrey,
Geneva, N. Y.

PREFACE.

The publication of this book is the result of the establishment of the agricultural experiment stations of the United States. At the present time there are in the vicinity of 30 persons on the working staffs of the state agricultural experiment stations. Who these persons are, and what they have done, is a subject of more than idle interest to many. The object of this volume is to supply this information, not as gossip, but in so far as it appertains to scientific work. Hence the biographical matter is confined to that which bears upon science, and nothing is presented, excepting the barest facts of biography.

This work is official to Jan. 1, 1889, in that, with few exceptions, all the information herein presented is supplied by the persons whose names are given. Those exceptions are practically official, as sent us in printed form by these persons. The list is not as complete as it should be, but is as exact as circumstances would allow. Some station workers would not favor us with the required information, which accounts for the lack of their names in the pages. Others gave incomplete data, either as to life history or to bibliography. Should it be deemed advisable to issue subsequent editions, it may be safely presumed that they will in a large measure, supply the lacking data of this, the first. Especially should we hope this to be true in relation to bibliography.

CHARLES S. PLUMB.

Knoxville, Ten., March, 1889.

MAR 1 1913

BIOGRAPHICAL INDEX

OF

AGRICULTURAL SCIENTISTS.

ADRIANCE, D.

Born Feb. 16, 1867, at Columbia, Brazoria county, Texas. Graduated at the Texas agricultural and mechanical college in 1886, with no degree. Assistant in agriculture at same college, 1886-87; now assistant in chemistry, at same, and in Texas agricultural experiment station. Address: College Station, Tex.

AINSWORTH, J. H.

Born Aug. 6, 1852, near Canton, Miss. Studied at university of Miss., 1871-72. Since 1887 foreman of Texas agricultural and mechanical college farm. Address: College Station, Tex.

ALVORD, HENRY E.

Graduated at Norwich university, Vermont, securing degrees of B. S. and C. E. Served in United States volunteers, and U. S. army (cavalry) from 1862-71, inclusive. On duty at Mass. agric. college, 1869-71. Engaged in farming and teaching from 1871-81 in Virginia and Massachusetts. Manager Houghton farm, N. Y., 1881-86. Prof. of agriculture, Mass. agr. college, 1886-88. President Maryland agricultural college, and director Maryland agricultural experiment station from April 1, 1888. Member various agricultural and dairy associations, the society for the promotion of agricultural science and the American association for the advancement of science. Is medalist of Royal agricultural society of Eng-

land, and British dairy farmers' association, for services rendered. Address: Agricultural College, Md.

PUBLICATIONS.

From 1872 to date has written for various American and English agricultural journals. Author of American chapters of Sheldon's "Dairy farming." Cassell & Co., publishers.

ALWOOD, WILLIAM B.

Born August 11, 1859, near Delta, Fulton county, Ohio. Attended Delta high school, Wooster university, Ohio state university, and Corcoran scientific school of Columbian university. For three years teacher in the common schools of Fulton county, Ohio. Superintendent field experiments, Ohio agricultural experiment station, May, 1882 to August, 1886. Observer Ohio meteorological bureau, June, 1882, to August, 1886. Assistant commissioner for Ohio to World's industrial and cotton centennial exposition, New Orleans, 1884-85. Special agent, division entomology, U. S. department of agriculture, June 1886-88. Assistant entomologist in same, 1888. Vice director Virginia agricultural experiment station. Address: Blacksburgh, Va.

PUBLICATIONS.

Ohio agricultural experiment station report, 1883.

On corn, pp. 53-89; potatoes, pp. 89-99; cattle feeding, pp. 99-132.

Ibid. for 1884. On wheat, pp. 12-61; oats, p. 63; corn, pp. 64-83; potatoes, pp. 84-100.

Ibid. for 1885. On wheat, pp. 10-19; corn, pp. 19-49; oats, pp. 50-56; potatoes, pp. 57-79; pig-feeding, pp. 80-87; cattle feeding, pp. 88-97.

Tests with insecticides on garden insects. *Bull. 13, div. entomology, U. S. dep't of agriculture*, 1886.

Report on Ohio insects. *Ibid.*, pp. 48-53.

Notes on insects and insecticides. Fifth rep't Ohio agr. exp. station, 1886, pp. 193-229.

On a system of classification of the agricultural varieties of wheat. Essay before Potomac grange, Washington, D. C., April 9, 1888.

On the artificial pollination of wheat. Paper before biological society of Washington, June 2, 1888.

ANDERSON, JAMES T.

Born in 1851. In 1872 graduated from Washington and Lee university. Pursued post graduate course in science (chemistry the chief study) at Vanderbilt university from 1876-79, receiving Ph.D. Tutor in English and mathematics at Vanderbilt while studying there. From 1879-86 professor of natural sciences in Central college, Missouri. In 1886 went to Germany, and studied and worked under Prof. Dr. A. W. Hofmann at the university of Berlin. In 1888 elected first assistant chemist to the Alabama agricultural experiment station. Address: Auburn, Ala.

ANNIS, FRANK J.

Graduate Mich. agr. college in 1875 with degree B.S., and later M. S. from same college. Professor mathematics and chemistry in Colorado agricultural college, 1879-81. Secretary Colorado state board of agriculture since 1881, and also secretary and treasurer Colorado agricultural experiment station. Address: Fort Collins, Col.

ARMSBY, H. P.

Born Sept. 21, 1853, at Northbridge, Mass. Educated in public schools of Northbridge and Millbury, Mass. Graduated from Worcester polytechnic institute in 1871 with degree of B. S. Assistant in chemistry at same institution, 1871-72. Post graduate studies in Sheffield scientific school of Yale college, 1872-74, receiving degree of Ph. B. Teacher of natural sciences Fitchburg (Mass.) high school, 1874-75. Studied at university of Leipzig, Germany, 1875-76, receiving degree of Ph. D. Assistant in chemistry Rutgers college, 1876-77. Chemist, Connecticut agricultural experiment station, 1877-81. Professor agricultural chemistry Storrs' agricultural school, Mansfield, Conn., 1881-83, and acting principal part of

time. Professor agricultural chemistry university Wisconsin, and associate director experiment station of Wisconsin university, 1883-87. Now director Pennsylvania state college agricultural experiment station. Address : State College, Penn.

PUBLICATIONS.

Experiments on the decay of nitrogenous organic substances. *Amer. jour. sci.* 1874, p. 337 ; *Proc. Am. ass'n adv. science*, 1874, p. 80.

Einwirkung der Schwefelsaure auf Phosphorsaurem Kalk. *Jour. prac. chem.*

Absorption of bases by the soil. *Amer. jour. sci.*, xiv, p. 25 ; *Landw. Vers. Station.*, xxi, p. 387.

Relation of the soil to water. Rep. Conn. exp. station, 1877, p. 81.

Experiments on the relations of the soil to water-capillary transmission and evaporation. Rep. Conn. exp. station, 1878, p. 83.

Determination of albuminoids in feeding stuffs, Rep. Conn. exp. station, 1879, p. 104 ; *Amer. chem. jour.*, II, 1

Reports on recent progress in agricultural science, *Amer. chem. jour.*, II, 4.

Manual of cattle feeding, New York, 1880.

Observations on the feeding of milch cows as practiced in Connecticut. Rep. Conn. exp. sta., 1881, p. 90.

Farmer's annual hand-book (with Dr. E. H. Jenkins), 1882-3

Digestion experiments. Rep. Wis. exp. station, 1884, p. 67 ; *Amer. jour. science*, xxix, p. 355.

Value of cotton-seed meal and malt sprouts as feed for milch cows. Rep. Wis. exp. station, 1884, p. 78.

Comparative value of old and new process bran. *Ibid.*, 1885, p. 86.

Value of new process oil-meal as compared with corn-meal for milk production. *Ibid.*, 1885, p. 97.

The Cooley system of creaming milk. *Ibid.*, p. 118 ; *Forsch. auf dem Gebiete der Vieh-Haltung*, Heft 17, p. 1 ; *Proc. soc. pro. agr. science*, 1884, p. 49.

Relation of fat of milk to butter yield. Rep. Wis. exp. sta., 1885, p. 122.

Feeding value of roller bran. *Ibid.*, 1886, p. 113.

Influence of the nutritive ratio on milk production. *Ibid.*, p. 147.

Analyses of milk of different breeds of cows. *Ibid.*, p. 159.

Tests of dairy cows at Wisconsin state fair. Bulletin 10, Wisconsin experiment station.

An apparatus for the estimation of nitrogen by Kjeldahl's method. *Amer. chem. jour.*, viii, 1, with F. G. Short.

Digestibility of maize stover. *Agricultural science*, II, p. 149, with Wm. Frear.

Has contributed numerous articles and reports, also, in popular agricultural and scientific periodicals.

ARTHUR, JOSEPH CHARLES.

Born Jan. 11, 1850, at Lowville, N. Y. Early education in public schools. Graduated at Iowa agricultural college in 1872 with the degree of B. S., in 1877 receiving M. S. from same college, where was assistant in biology during 1877-78. Studied at Johns Hopkins university in 1879, and at the Harvard university summer school in 1879-80. Instructor in botany at university of Wisconsin, 1879-81. Lecturer on botany in summer school of the university of Minnesota, 1882. Botanist to the New York agricultural experiment station, 1884-87. Received degree of D. Sc., from Cornell university in 1886 for post-graduate work. Professor of botany, Purdue university, 1887, and at present of vegetable physiology and pathology. Botanist to the Purdue university agricultural experiment station, and since 1885, to the geological and natural history survey of Minnesota. Since 1883 co-editor of *Botanical gazette*. Address: Lafayette, Ind.

PUBLICATIONS.

Flora of Iowa. 1876.

Iowa Uromyces. 1883.

Four reports to the New York agricultural experiment station, chiefly relating to plant diseases. 1884-87.

History and biology of pear blight. 1886.

Hand-book of plant dissection. 1886. Aided by C. R. Barnes and J. M. Coulter.

Many papers in journals, proceedings of societies and other forms of publication.

ATKINSON, GEORGE F.

A native of Michigan. Graduated from Cornell university in 1885, with degree of Ph. B. While at Cornell held a fellowship in botany, and was instructor in that branch. Was associate professor of natural history at the univer-

sity of North Carolina till 1888. Now holds the chair of botany and zoölogy at the university of South Carolina, and is entomologist to the South Carolina agricultural experiment station. Address: Columbia, S. C.

ATWATER, WIBUR OLIN.

Born May 3, 1844, in Johnsburg, New York. Graduated from Wesleyan university, Middletown, Conn., in 1865. Studied chemistry at New Haven, receiving Ph. D. from Yale college in 1869, and made a special study of physiological and agricultural chemistry for two years at the universities of Leipzig and Berlin, also visiting European experiment stations. During 1871-72 held chair of chemistry in the university of Tennessee (then East Tennessee univ.), in 1873 was called to a similar place in Maine state college, and the same year returned to Wesleyan university to become professor of chemistry. From 1875-77 director of Connecticut agricultural experiment station, the first director of the first agricultural experiment station in the United States. During 1882-83 over a year was spent in Europe, mostly in Munich and Heidelberg, working in physiological chemistry. For a number of years has been a member of the board of control of the Connecticut agricultural experiment station. Since April 1, 1888, director of Storrs' school agricultural experiment station at Mansfield, Conn. In latter part 1888 appointed director of the office of experiment stations of the United States department of agriculture. Address: Washington, D. C.

PUBLICATIONS.

Has published numerous papers in journals of Germany, France and the United States. With G. B. Goode is the author of "The American Menhaden." A number of the more important ones in agricultural and physiological chemistry have been published in the *American chemical journal*. About 70 articles on "science as applied to farming" ran through the *American agriculturist* from 1874-81, and a series not yet completed in the *Century magazine* on "the chemistry of food." Among the agricultural papers

have been the reports of the Connecticut agricultural experiment station for 1876-78, and numerous papers in reports of the Connecticut board of agriculture.

BABCOCK, S. MOULTON.

Born Oct. 22, 1843, at Bridgewater, N. Y. Graduated at Clinton liberal institution, 1862, and from 'Tufts' college, Mass., 1866, with degree of B. A. From 1872-75 student in chemistry at Cornell university, and from 1876-79, at Göttingen, Germany, receiving Ph. D. from latter, in chemistry. Instructor in chemistry at Cornell university, 1875-77, and 1881-82. Chemist to New York agricultural experiment station, Geneva, 1882-87. Professor of agricultural chemistry in university of Wisconsin, and chemist to the Wisconsin agricultural experiment station, since 1888. Address: Madison, Wis.

BAILEY, JR., L. H.

Born in 1858 at South Haven, Van Buren county, Michigan. Graduated from Michigan agricultural college in 1882, with degree of B. S., later receiving M. S. From 1882-84, assistant to Dr. Asa Gray at Harvard university. Professor of horticulture and landscape gardening at Michigan agricultural college, January, 1885 to August, 1888. Since then professor of horticulture at Cornell university, and horticulturist to the agricultural experiment station of the same. Address: Ithaca, New York.

PUBLICATIONS.

Talks afield. Houghton, Mifflin & Co., 1884.

Field notes an apple culture. Orange Judd Co., 1886.

Published a technical contribution on the genus *Carex*, of over 100 pages, in the proceedings of the American academy of arts and sciences.

BALDWIN, JOHN P.

Graduated at Berea college, Ohio. In charge of the Louisiana sugar experiment station sugar house. Address: Kenner, La.

BALENTINE, WALTER.

Native of Maine. Graduated from the Maine state college in 1874, with degree of B. S., and later given M. S. A post-graduate student two years at Wesleyan university, and assistant to Prof. W. O. Atwater in the Conn. agricultural experiment station. Studied one year at the university of Greifswold, Germany, and was assistant for one year in the experiment station at Halle, Germany. Was assistant chemist in the department of agriculture at Washington, under Prof. Peter Collier. From 1881 to date, professor of agriculture at the Maine state college. Is also engaged in experimental work in connection with the Maine experiment station. Address : Orono, Me.

BARROW, D. N.

Graduate of the Louisiana state university. Assistant in the Louisiana state agricultural experiment station. Has degree of B. S. Address : Baton Rouge, La.

BARTLETT, J. M.

Born Sept. 25, 1857, at Litchfield, Maine. Educated in public schools and Litchfield academy, Maine. Graduated at Maine state college in 1880, in chemical course, with degree of B. S. Post-graduate student at Cornell university in 1883 under Dr. G. C. Caldwell. Assistant chemist engaged in special analytical work at Penn. state college, 1883-85. Assistant chemist Maine agricultural experiment station, 1885-87. Now chemist to Maine state college agr. exp. station. Address : Orono, Me.

BATTLE, HERBERT B.

Graduated at university of North Carolina in 1888, with degree of B. S. From 1881-87 assistant chemist to North Carolina agricultural experiment station. Professor of chemistry to Leonard medical school, Raleigh, N. C., 1886 to date. Ph. D. from univ. of North Carolina, 1887. In 1887 elected director of North Carolina agricultural ex-

periment station, and also state chemist. Address: Raleigh, North Carolina.

PUBLICATIONS.

Chemical conversion tables. 1885, with F. B. Dancy.

Author of numerous papers on chemical subjects in the journal of Elisha Mitchell scientific society, and other periodicals.

BEAL, W. H.

Born Dec. 9, 1867, at Old Church, Virginia. Educated in home schools. Graduated from Virginia agricultural and mechanical college, 1886, with degree of B. A. and M. E. Since Jan. 1, 1887, assistant chemist to Mass. agricultural experiment station. Address: Amherst, Mass.

BEAL, WILLIAM J.

Born March 11, 1833, in Lenawee county, Michigan. Graduated from the university of Michigan, classical course, in 1859, with degree of A. B., and later received M. A. from same. In 1865 studied at Harvard in scientific course, studying mostly with Agassiz and Gray, receiving B. S. From 1859-62 teacher in Friends' academy, and in Howland institute, Union Springs, New York. Prof. of botany and zoölogy in Chicago university, 1868-70, and lecturer in several other colleges and academies. From 1870-72 professor of botany in Michigan agricultural college, and professor of botany and horticulture in same from 1872-82. Since 1882 professor of botany and forestry in same. Given degree of M. S. by Chicago university in 1870, and Ph. D. by university of Michigan in 1880. President Michigan teachers' association in 1882. Secretary American pomological society for four years. First president (for two years) of Society for the promotion of agricultural science. In 1883 president of biological section American association for the advancement of science. Director state forestry commission 1887-88. Botanist to the Michigan agricultural experiment station. Address: Agricultural college, Mich.

PUBLICATIONS.

The new botany.

The grasses of North America. Vol. I, 1887.

BECKWITH, MILTON H.

Born in 1852 at Elmira, New York. Educated in schools of that city. Assistant horticulturist to New York state agricultural experiment station at Geneva, 1885-88. At present professor of horticulture and entomology in Delaware college, and horticulturist and entomologist to the Delaware agricultural experiment station. Address: Newark, Delaware.

BESSEY, CHARLES E.

Born in 1845 in Wayne county, Ohio. Was educated in Seville academy, Canaan academy and Michigan agricultural college; studied also at Harvard university. Degree of B. S. and M. Sc. from Mich. agric. college, and Ph. D. from university of Iowa. Acted as instructor in botany and horticulture, then professor of same, and finally professor of botany alone, at Iowa agricultural college, covering years 1870-84. Was vice-president Iowa agricultural college. Lecturer in university of Colorado. Since 1884 professor of botany and horticulture, university of Nebraska, and director agricultural experiment station of same institution. Botanical editor *American naturalist* since 1881. Address: Lincoln, Neb.

PUBLICATIONS.

Contributed to various agricultural papers, and before several agricultural and scientific societies. Also, geography of Iowa; botany for high schools and colleges; essentials of botany; American edition of McNab's botany; grasses and forage plants of Nebraska, vols. I and II; etc., etc.

BILLINGS, Frank S.

Born in 1843 at Boston, Mass. Educated in Massachusetts schools, and in the veterinary institute and medical school of the university of Berlin, Germany.

Has the degree of D. V. S. Acted as pathologist to New York polyclinic school of medicine. Now director pathological laboratory university of Nebraska, and veterinarian agricultural experiment station same institution. Is also a professor of microscopy and pathology for Chicago veterinary school. Address : Lincoln, Nebraska.

PUBLICATIONS.

Relations of animal diseases to public health.

Bulletin 3, vol. II, university of Nebraska experiment station.

Numerous articles in the Journal of comparative medicine, and elsewhere.

BILLOW, RUSSELL.

Graduate of Sewanee university, Tenn., and assistant in the Louisiana sugar experiment station. Address : Kenner, La.

BIRD, MAURICE.

Graduated at the university of Virginia. Assistant and chemist to the sugar experiment station, Kenner, Louisiana. Address : Kenner, La.

BISHOP, WILLIAM H.

Native of Rhode Island ; born at Arlington Mills, June 11, 1859. Studied at Friends' N. E. boarding school, Providence, R. I., 1874-75, and North Attleboro high school, Mass., 1876-77. Graduated Mass. agr. college 1882, with degree B. S. Supt. experimental department Hiram Sibley's seed farm, Rochester, N. Y., 1882-84. Supt. agricultural department, Tougaloo university, Miss., 1884-88. Since April 1, 1888, horticulturist to Maryland agricultural experiment station, and lecturer in Maryland agricultural college. Address : Agricultural College, Md.

BLOUNT, AINSWORTH E.

Graduated from Dartmouth college, Hanover, N. H., 1859 with degree of A. B. Taught for 17 years in acad-

emies in Tennessee and Illinois. Since 1879 professor of agriculture, Colorado agricultural college. In 1888 appointed agriculturist to Colorado agricultural experiment station. Address : Fort Collins, Col.

BOLTON, B. M.

Born in Virginia in 1859. Pursued a complete academic course at the university of Virginia, and later graduated there with degree of M. D. Practiced medicine three years in Virginia and Mississippi. In 1882 appointed tutor in English and mathematics at South Carolina college, in the meantime pursuing post-graduate work in the chemical laboratory. In June, 1883, went to Europe and studied chemistry under Bunsen at Heidelberg, and physiology, hygiene, histology and bacteriology at Göttingen, Wurtzburg and Berlin under Flügge, Krause and Koch. In October, 1886, appointed assistant in bacteriology and pathology at Johns Hopkins university. In 1888 elected to the chair of physiology and hygiene at the university of South Carolina and bacteriologist to the South Carolina agricultural experiment station. Address : Columbia, S. C.

BOWMAN, WALKER.

Born, 1860. Native of Virginia. Educated at the university of Virginia and at university of Berlin, Germany, taking Ph. D. in 1888 at latter place. Address : Blacksburg, Virginia.

BRACE, DEWITT B.

Born in 1859. Graduated at Boston university in 1881, with degree of A. B. and received A. M. from same institution in 1882. Received Ph. D. from university of Berlin, Germany, in 1885. Acted as assistant professor of physics, in University of Michigan. Now meteorologist to university of Nebraska agric. experiment station. Address : Lincoln, Neb.

PUBLICATIONS.

Ueber die Faradaysche Wirkung u. einige Fälle der Brechung. *Wied. Annal.*, 1885.

On magnetic double circular refraction. Before *British assn. for adv. of science*, Aberdeen, 1885.

On the splitting of rays in double refracting media. Before *Amer. assn. adv. of science*, Buffalo, 1886.

On the transparency and viscosity of ether ; and on a method of examining magnetic double circular refraction. *Amer. assn. adv. of science*, N. Y., 1887.

On the transparency of ether. *University of Nebraska studies*, 1888.

BRINKLEY, ERNEST H.

Graduate of Baltimore & Ohio machine shops, 1879. Farming, and dealing in agricultural implements and machinery, in Somerset county, Md., from 1880-88. Now machinist to Maryland agricultural experiment station. Address : Agricultural College, Md.

BROOKS, WILLIAM P.

Born Nov. 19, 1851, at South Scituate, Mass. Educated in the public schools and Hanover academy, Mass. Teacher in ungraded and grammar schools, 1870-72. Graduated from the Mass. agricultural college in 1875 with degree of B. S., and post graduate in chemistry and botany, 1875-76. Professor of agriculture and director of Imperial college of agriculture farm, Sappora, Japan, 1877, and additionally appointed professor of botany and acting president in 1880; relieved of latter position 1883, but re-appointed again in 1886, and again relieved of acting presidency, and also farm directorship in 1887. In June, 1888, elected professor of agriculture to the Mass. agricultural college. Address : Amherst, Mass.

PUBLICATIONS.

Papers in second, third and fourth annual reports; editor of and author of papers in fifth annual and sixth reports, covering years 1881-86, inclusive, all of the Imperial college of agriculture, Sappora, Japan.

BROSE, C. MAX.

Assistant horticulturist and in charge of apiary at Colorado agricultural experiment station. Address: Fort Collins, Col.

BROWN, LE ROY DECATUR.

Born Nov. 3, 1848, in Noble county, Ohio. Educated in country schools, and the Ohio Wesleyan university. Served two years in the Federal army before 18 years of age. After the war returned to the farm. In 1869 entered college and graduated in the classical course, and later became city superintendent of public schools at Hamilton, Ohio. In 1882 travelled in Europe. Was elected state superintendent of public instruction of Ohio in 1883, which position he held till 1887 when he was called to Nevada, to become president of the Nevada state university, and director of the state agricultural experiment station at Reno, Marshall county, Nevada. Member of New Orleans academy of sciences, and a life director of the national educational association. Address: Reno, Nevada.

PUBLICATIONS.

Written extensively for educational magazines, published five reports of Hamilton, Ohio, public schools, and three reports of public schools of Ohio.

BRUNER, LAWRENCE.

Born in 1856 in Lehigh county, Pennsylvania. Educated at university of Nebraska. Is assistant entomologist to United States department of agriculture; entomologist in United States entomological commission, and entomologist to Nebraska agricultural experiment station at university of Nebraska. Address: Lincoln, Neb.

PUBLICATIONS.

The Orthoptera of Nebraska.

BRUNK, T. L.

Born July 30, 1859, near Ottawa, Ill. Graduated from Cornell university in 1886 with degree of B. S. in agricul-

ture. Principal Tonica, Ill., high school, 1887. Now professor of horticulture and botany in Texas agricultural and mechanical college and also horticulturist to Texas agricultural experiment station. Address: College Station, Texas.

BUCKHOUT, WILLIAM A.

Born in 1846 at Oswego, N. Y. Educated in public schools in native town. Graduated at Penn. state college, in agricultural course, in 1868. Studied botany under tutor, and was special student in botany under Dr. J. T. Rothrock. From 1869-71 was farmer at Oswego, N. Y. In 1871 elected instructor in natural history at Penn. state agricultural college. Spent winter in special study of botany under Dr. Asa Gray at Cambridge. In 1872 was elected professor of natural history to Penn. state college, and also as entomologist (honorary) to the state board of agriculture. Elected botanist to Penn. state college agricultural experiment station. Address: State College, Penn.

PUBLICATIONS.

On the gall mites (Phytopti). Amer. assn. adv. of science, vol. xxxi.

BURLEIGH, BOBERT F.

Born Feb 17, 1862, at Franklin, New Hampshire. Educated in public schools of native town till 1879. Graduated at New Hampshire college of agriculture and mechanic arts in 1882 with degree of B. S., and from America veterinary college in 1885 with degree of D. V. S. After graduating appointed lecturer on veterinary science to N. H. agricultural college, and the following year instructor in veterinary medicine and surgery. In 1887 received degree of M. D. from Dartmouth medical college. In April, 1888, appointed to chair of physiology and veterinary science at Kansas agricultural college, and member of the agricultural experiment station council of same institution. Address: Manhattan, Kan.

BURRILL, THOMAS J.

Born April 24, 1839, at Pittsfield, Mass. Removed to Stephenson county, Illinois in 1848. Attended common district schools and Rockford, Ill. high school. Graduated Illinois state normal university in 1865. Was principal Urbana city schools 1865-1868. Assistant professor natural history Illinois industrial university 1868-70. Professor botany and horticulture, same institution, now known as university of Illinois, 1870 to date. Vice-president same, 1879 to date. Botanist and horticulturist to experiment station, 1888 to date. Member of various state, national and foreign societies, to which most of his publications have been contributed. Main specialty cryptogamic botany and diseases of plants. Address; Champaign, Ill.

BUTZ, GEORGE C.

Born Feb. 1, 1863, at New Castle, Penn. Early education in public schools of that city. Graduated at Penn. state college, in 1883, with degree of B. S. Engaged in horticultural work at home during 1883. Taught in preparatory department Penn. state college, 1884. Engaged in horticultural work, New Castle, Penn., and one year in California, 1885-87. In July, 1887, elected horticulturist to Penn. state college experiment station, which position he now holds. Address: State College, Penn.

CALDWELL, GEORGE C.

Born in Framingham, Mass. Primary education in public schools and academies of Massachusetts, and in New Hampshire while parents resided in that state. Graduated in 1855 from Lawrence scientific school of Harvard university, with degree of B. S. Spent two and one-half years at universities of Göttingen and Heidelberg, Germany, receiving Ph. D. from former university. Professor chemistry, physics, and botany in Antioch college, Ohio, 1859-62. In service of United States sanitary commission from 1862-64. Professor chemistry Penn. agricultural

college, 1864-68, and part of the time vice-president of the same institution. Professor agricultural chemistry, Cornell university, New York 1868-73. Professor of agricultural and analytical chemistry, same institution, 1873, to date. Fellow American association for the advancement of science; member of society for promotion of agricultural science. Address: Ithaca, New York.

PUBLICATIONS.

Agricultural chemical analysis. 1869.

Introductory chemical practice. 1872, (with Prof. A. A. Brenerman).

Manual of quantitative analysis. 1885 (with Dr. S. M. Babcock).

Notes on chemical analysis. 1887.

Papers in 1st Annual report Cornell university experiment station. 1880: Experiments with various fertilizers on Indian corn; influence of the ration on the composition of the milk; testing milk with the lactobutyrometer; analyses of plaster; determination of sugar in beets; with Miss J. Chevalier, Carnots' method for the determination of potash.

In second report, Cornell university experiment station: Relation of effect of the ration to its composition; methods of analyzing milk compared; new form of fat extractor; feeding experiments with malt sprouts, and with ensilage for cows; Pember-ton's method for the determination of phosphoric acid in fertilizers.

In third report Cornell university experiment station: Comparison of the productive effect of the same ration with different breeds of cows; gain of steers on a fattening ration. Test of sampling silage; effect of a maintenance ration with steers; cost of plant food in fertilizers as sold in the state of New York; effect of potash salts as fertilizers for the grape.

Experimentation and chemical analysis as handmaids of agriculture. Trans. N. Y. state agr. soc., 1887, and other addresses before western New York horticultural society, Massachusetts horticultural society, American dairyman's association, and society for the promotion of agricultural science.

Marchaud du Fecamps' method for the determination of fat in milk (with S. W. Parr).

CALDWELL, WILLIAM HUTSON.

Born April 15, 1866, at Peterboro, New Hampshire. Attended grade and high schools at home, and English and classical school at West Newton, Mass., 1881-83. Graduated at Mass. agricultural college 1887 with degree

of B. S. From 1887-88, assistant in field and stock experiments at Mass. agr. exp. station. At present agriculturist to Penn. state college experiment station, and instructor in agriculture at Penn. state college. Address: State College, Penn.

CAMPBELL, JOHN P.

Born Nov. 20, 1863, at Cumberland, Maryland. Attended Allegany county academy at Cumberland and private school in Darnestown, Md., until fall of 1881. Graduated from Johns Hopkins university in 1885 with degree of A. B. Held university scholarship for 1885-86 session, a fellowship during 1886-87, and was a fellow by courtesy the next year, graduating as Ph. D. in 1888. Now professor of biology in university of Georgia, and entomologist to Georgia agricultural experiment station. Address: Athens, Georgia.

CARPENTER, FRANK R.

Born May 7, 1864, at Leyden, Mass. Public school education in home schools, and at Power's institute, Bernardston, Mass., for two years. Graduated at Mass. agr. college in 1887, with degree of B. S. Assistant chemist at Mass. agr. experiment station, 1887-88. Since 1888, assistant chemist North Carolina agricultural experiment station. Address: Raleigh, N. C.

CARPENTER, LOUIS G.

Graduated at the Michigan agricultural college in 1879 with degree of B. S., and given M. S. by same college in 1882. Assistant in mathematics and engineering at the Mich. agricultural college for eight years; and during 1884-85 acting professor of mathematics. Since Sept. 1, 1888, has occupied chair of physics and irrigation engineering at Colorado agricultural college. Is meteorologist and irrigation engineer to Colorado agricultural experiment station. Address: Fort Collins, Col.

CARR, OMA.

Assistant in laboratory, United States department of agriculture. Address : Washington, D. C.

CARSON, J. W.

Born Jan. 3, 1865, in Colorado county, Texas. Graduated from Texas agricultural and mechanical college in 1886, with no degree. Connected with Texas coöperative association, 1887. Now assistant to director, Texas agricultural experiment station. Address : College Station, Texas.

CASSIDAY, JAMES.

Did special scientific work at Mich. agr. college, for which given B. S. degree. For several years at Royal botanic gardens, Regent's Park, London, Eng., and with a nursery firm in same city. For four years with Peter Henderson, N. Y. City, and 10 years florist and horticulturist at the Michigan agricultural college. Since 1883 professor of horticulture at the Colorado agricultural college, and during three years in this period in charge of entomology. Now horticulturist and entomologist to the Colorado agricultural experiment station. Address : Fort Collins, Col.

CHARBONNIER, L. H.

Born August 2, 1838, in France. Educated in the Lyceum, and afterwards at St. Cyr. From 1866-77, professor of engineering in the university of Georgia. From 1877 to date, professor of physics and astronomy at same institution, and in charge of the meteorological work of the experiment station. Address : Athens, Georgia.

CHESTER, FREDERICK D.

Born in Connecticut in 1862. Educated at Washington university, St. Louis. Graduated at Cornell university in 1882 with degree of B. S. Given M. S. by Cornell

in 1886. Professor of botany at Delaware college from 1882 to date. Botanist to Delaware agricultural experiment station; appointed, 1888. Address: Newark, Del.

CLARK, JOHN WESLEY.

Born November 1, 1849, at North Hadley, Mass. Studied at Hopkins academy, Hadley, 1866-67. Graduated at Massachusetts agricultural college in 1872, with degree of B. S. Nurseryman, T. C. Maxwell & Bros., Geneva, N. Y., 1872. Foreman of nursery at Quincy, Ky., and Brenham, Tex., 1874-77. Superintendent of Mass. agric. college nursery, 1877-82. Instructor in agriculture and farm superintendent at same 1883-84. Superintendent Connecticut valley orchard company, Deep River, Conn., 1884-85. Fruit grower in North Hadley, Mass. 1885-88. Elected professor of botany and horticulture at university of Missouri in fall of 1888, and horticulturist to agricultural experiment station. Address: Columbia, Missouri.

PUBLICATIONS.

Has contributed to agricultural journals quite largely.

COFFIN, LEWIS A.

Graduated at Colorado agricultural college in 1888 with degree of B. S. Now assistant chemist, Colorado agricultural experiment station. Address: Fort Collins, Col.

COLBY, GEORGE ELDEN.

Born November 11, 1860, at Claremont, Alameda Co., California. Graduated from the university of California in 1880 with degree of Ph. B. Engaged in chemical work under Prof. E. W. Hilgard for United States census for 1880. Analyzed soils, waters and "alkali deposits," and assayed coal and iron for the northern transcontinental survey of the northern Pacific railroad company, 1880-84. Engaged in special chemical analyses of California soils and min-

eral waters; also soils of the Sandwich islands, and ash of the fruit and leaves of the Sandwich islands banana, 1884-1885. In 1885 appointed second assistant in the viticultural laboratory, university of California, which position he now holds. Address: Berkeley, California.

PUBLICATIONS.

Analysis of the ash of two California wheats.—Appendix No. 7, report college of agriculture, university of California, 1880.

COLLIER, PETER.

Born Aug. 17, 1835, at Chittenango, N. Y. Early education at native home in Yates polytechnic institute. Graduated at Yale college in 1861 with degree of B. A., later receiving A. M. from same, and M. D., from university of Vermont. Studied in Sheffield scientific school of Yale, and assisted in laboratory, receiving Ph. D. from this school in 1866. From 1867-77 professor of analytical chemistry, mineralogy and metallurgy, university of Vermont, and of general chemistry in the medical department of which he was dean. From 1872-76, secretary Vermont state board of agriculture, mining and manufacture. Appointed U. S. commissioner to world's exposition at Vienna, in 1873. From 1877-83 chief chemist to U. S. department of agriculture, Washington, D. C. In Jan., 1888, became director N. Y. state agricultural experiment station, at Geneva. Address: Geneva, N. Y.

PUBLICATIONS.

Annual reports chemist, U. S. depart. of agr., 1877-83. Sorghum, 1883.

COLLINGWOOD, C. B.

Born in 1860. Graduated at Mich. agricultural college in 1885 with degree of B. S. Assistant chemist to Arkansas agricultural experiment station. Address: Fayetteville, Ark.

COMSTOCK, JOHN HENRY.

Born Feb. 24, 1849, at Janesville, Wisconsin. Educated in district schools, Mexico academy, Mexico, New York,

Fallen seminary, Fulton N. Y., Cornell university and Yale college. Instructor at Cornell university 1873-77. Lecturer at Vassar College, 1888. Assistant professor entomology at Cornell univ., 1879-81; professor of entomology and invertebrate zoölogy at Cornell, 1882 to date. Address: Ithaca, N. Y.

PUBLICATIONS.

Author of notes on entomology. Reports of United States entomologist for 1879 and 1880. Report on cotton insects. Monograph of the Diaspinæ. Report on insects for 1881. An introduction to entomology. Numerous articles in various scientific and agricultural journals.

CONNAWAY, JOHN W.

Born Nov. 18, 1859, in Cedar county, Missouri. Educated in the common schools of Missouri, the state normal school of south Missouri, and the university of Oregon. Took a commercial course in the Portland, Oregon, business college, and medical course at the Missouri state university. Pursued special studies in microscopy and veterinary science in the university of Missouri experimental and vaccinal laboratory under Dr. Paul Paguin, state veterinarian. Previous to studying medicine, was engaged for a time at farming and stock raising, teaching, and later accountant in wholesale agricultural implement house at Portland, Oregon. Address: Columbia, Missouri.

CONNELL, J. H.

Born July 9, 1864, in Arkansas. Resident of Mississippi 17 years. Graduate Miss. agricultural and mechanical college, 1888, with degree of B. S. Assistant agriculturist experiment station of same college, 1888. Agriculturist Kentucky agricultural and mechanical college experiment station, Sept., 1888, to date, and professor of agriculture in Kentucky agricultural and mechanical college. Address: Lexington, Ky.

COOK, ALBERT J.

Born Aug. 30, 1842. Graduated from the Mich. agricultural college in 1862, with degree of B. S. Went to

California in 1863, where staid three years, teaching in Eureka and Sacramento. Studied law in 1866, and the same year appointed instructor in Mich. agr. college. During 1867-68 was at the Harvard university museum of comparative anatomy. Is professor of entomology in the Mich. agr. college, and entomologist to the agricultural experiment station of the same institution. Address: Agricultural College, Mich.

PUBLICATIONS.

Has written much for agricultural papers for many years.

Injurious insects of Michigan.

Manual of the apiary.

COOK, GEORGE H.

Born Jan. 5, 1818, at Hanover, Morris county, New Jersey. Studied in the schools of native home, and graduated from the Rensselaer polytechnic institute, at Troy, N. Y., in 1839. Was civil engineer from 1836-38. Taught at Troy in institute from 1842-46, being senior professor there at the latter date. From 1846-48 in business in Albany, N. Y., and professor of mathematics in Albany academy, 1848-50, and principal of same school, 1852-53. Late in 1853 took chair of chemistry and natural history at Rutgers college, New Brunswick, N. J.; for several years of late has acted as vice-president of same. Upon the establishment of the New Jersey geological survey, was elected assistant, acting from 1854-56, when the survey was abandoned. In 1864 the survey was again organized, and Dr. Cook was appointed state geologist, which position he still holds. Was the means of establishing the Rutgers scientific school in 1862 as a branch of the college. When the state agricultural experiment station was established in 1879, was elected director, which position still holds. Was given Ph. D. by the university of the city of New York, and LL.D. by Union college. Address: New Brunswick, New Jersey.

PUBLICATIONS.

All the reports of the New Jersey geological survey, and the New Jersey agricultural experiment station, as well as minor papers and addresses.

COOPER, L. A.

Born Sept. 6, 1861. Graduated at Franklin county grammar school, St. Albans, Vt., 1880. Clerk in drug store 1880-84. Entered university of Vermont in Sept., 1884. Assistant chemist Vermont agricultural experiment station from March, 1887. Address : Burlington, Vt.

CORY, C. F.

Graduated at the Alabama agricultural and mechanical college in 1887, with the degree of B. S. Assistant in experimental agriculture, Arkansas agricultural experiment sub-station. Address : Pine bluff, Ark.

CRAMPTON, CHARLES A.

Graduated at the university of Michigan in 1882 with degree of B. L. Studied medicine from 1882-84, receiving M. D. Was assistant in chemical laboratory United States department of agriculture. In 1885 in charge of the New Orleans sugar station of same department, and in 1887 of the Fort Scott, Kansas, sugar station. At present first assistant chemist, U. S. dept. of agriculture. Address : Washington, D. C.

PUBLICATIONS.

See bulletins chemical division, U. S. dept. of agriculture, 3-17.

The analysis of sugar cane and beet juices, with a table for the calculation of analyses. *Chem. news*, lv, 207.

Estimation of the carbonic acid in beer and other aerated beverages, Crampton and Trescott, *Amer. chem. jour.*, ix, 290.

Ueber die Zusammensetzung des Weizenkeimes und über die Anwesenheit von einer neuen Zuckerart und von Allantoin, *Berichte*, xix, 1180. Richardson and Crampton.

CRANDALL, A. R.

Born Sept. 16, 1840, at Genesee, New York. Early education in the common school and in Alfred academy, N. Y. Graduate of Milton college, Wisconsin. After teaching several years, pursued post-graduate studies at Harvard under Profs. Agassiz, Gray and Shaler from

1868-73 inclusive. Appointed assistant to Kentucky geological survey 1873. Instructor in natural history at Kentucky agricultural and mechanical college, 1874. and in 1875 appointed to chair of natural history at same. Botanist to experiment station. Address: Lexington, Ky.

PUBLICATIONS.

Various reports on the geology of eastern Kentucky. Reports on the timbers of Greenup, Carter, etc.,

CROZIER, A. A.

Born Sept. 22, 1856, at Hudsonville, Mich. Attended district school, and Grand Rapids high school. Graduated from the Michigan agricultural college in 1879 with the degree of B. S., and from university of Michigan in 1885 received the degree of M. S. From Sept., 1886, to April, 1888, assistant botanist to the United States department of agriculture. Now botanist to the Iowa agricultural experiment station. Address: Ames, Iowa.

CROSSMAN, S. H.

Born in 1863. Graduated at Cornell university in 1888 with degree of B. S. Entomologist to Arkansas agricultural experiment station. Address: Fayetteville, Ark.

PUBLICATIONS.

A new wheat insect.

CURTIS, GEORGE W.

Born Dec. 11, 1860, in Bremer county, Iowa. Graduated from Iowa agricultural college in 1883 with degree B. S. A., and received honorary degree M. S. A. by same in 1887. Deputy treasurer Iowa agricultural college, 1883, and since then the professor of agriculture in the Texas agricultural and mechanical college, and agriculturist to the Texas agricultural experiment station. Address: College Station, Tex.

PUBLICATIONS.

Author of a work on live stock (horses, cattle, sheep and swine) published in 1888.

CURTIS, HENRY E.

Born August 30, 1869, near Lexington, Kentucky. Graduated at the agricultural and mechanical college of Kentucky, 1888, with degree of B. S. Second assistant chemist Kentucky agricultural experiment station. Address: Lexington, Ky.

DABNEY, JR., CHARLES W.

Born on June 19, 1855, at Hampden Sidney, Virginia. Early education at home and at Hampden and Sidney college, graduating at latter in 1873 with degree A. B. Taught private school, 1873-74. Graduated from university of Virginia in various schools in 1877. Taught during 1877-78 at Emory and Henry college, Virginia, as professor of chemistry and mineralogy. Studied at Berlin and Göttingen, Germany, at the former in chemistry and physics, and at latter the same, with mineralogy, receiving from Göttingen degree of Ph. D. in 1880. In November, 1880, elected state chemist to North Carolina, with laboratory at univ. of N. C., at Chapel Hill. On the permanent establishment of the agricultural experiment station, became full director of same, at Raleigh, in 1881. Chemist N. C. state board health 1881-83. Made special report on North Carolina phosphates, 1884, and also on pyrites in 1885. Since 1888 president of university of Tennessee and director Tenn. agr. exp. station. Fellow American association for the advancement of science, member German chemical society, American institute mining engineers, Virginia historical society, etc. Address: Knoxville, Tenn.

PUBLICATIONS.

Cinnabar. *Chem news*, 1877. Isopikraminic acid. *Amer. chem. jour.*, 1881. *Annalen der chemie*, 1881.

On the determination of nitrogen. *Amer. chem. jour.*, 1883.

For two years edited *Proc. ass. off. agr. chemists*, 1883-84.

Phosphates of North Carolina. Private paper, 1884.

Notes on occurrence of cassiterite in North Carolina. Before Elisha Mitchell scientific society.

Author of all reports and bulletins of North Carolina agricultural experiment station from 1880-86 inclusive, which include many papers of special interest.

DEVOL, W. S.

Born March 24, 1860, near Marietta, Ohio. Educated in district school. Graduated at Ohio state university in 1886 with degree of B. Ag. Assistant in botany, Ohio state university, 1881-86. Botanist to Ohio agricultural experiment station, 1882-86. Superintendent of field experiments of same, 1886-88, and botanist and bursar, since 1888. From 1886-88, superintendent of farm, Ohio state university. Address : Columbus, Ohio.

DINWIDDIE, R. R.

Born in 1858. Studied arts at Durham university ; medicine at university of Edinburgh and veterinary surgery at the Ontario veterinary college. Now veterinarian to the Arkansas agricultural experiment station. Address : Fayetteville, Ark.

DUGAN, JOHN.

Assistant in laboratory, U. S. department of agriculture. Address : Washington, D. C.

DUGGAR, J. F.

Born Aug. 24, 1868, near Demopolis, Ala. Graduated at the Miss. agricultural and mechanical college, 1887, with degree of B. S., and as post-graduate student of the same, given M. S. in 1888. Now assistant in agriculture at the Texas agricultural and mechanical college, and experiment station at the same. Address : College Station, Texas.

EDSON, HUBERT.

Graduated at Hanover college and Columbian university. Assistant chemist, in general agricultural chemistry, U. S. dept. of agriculture. Address : Washington, D. C.

PUBLICATIONS.

Prepared report of experimental work at Rio Grande, N. J., in bulletins 17 and 18 of chemical division U. S. dept. of agriculture.

EMERY, FRANK E.

Studied in public schools of Maine, at Maine central institute, Pittsfield, and graduated from Maine state college in 1883 with degree of B. S. From January to November, 1884, second assistant at Houghton farm, Mountainville, N. Y., then to November, 1886, first assistant. From February to December, 1887, superintendent, Maplecroft stock farm, Pawling, N. Y. Since December, 1887, supt. of New York agricultural experiment station farm. Address : Geneva, N. Y.

FAKE, NORMAN J.

Graduate of the school of chemistry, Columbian university. Assistant chemist in U. S. department of agriculture, in general agricultural analyses, especially sugar and lard. Address : Washington, D. C.

FARRINGTON, E. H.

Graduated from Maine state college in 1881. Post graduate student at Yale college in chemistry. For five years assistant chemist to the Conn. agricultural experiment station at New Haven. Now assistant chemist to the New Hampshire agricultural experiment station. Address : Hanover, N. H.

FERNALD, CHARLES H.

Born March 16, 1838, in Hancock county, Mt. Desert island, New Hampshire. Went to sea in early days. Taught country schools winters. Attended Maine Wesleyan seminary to fit for college, and took two years of college work when the war broke out. Entered the U. S. navy, in which was an officer three years, when the college studies were completed. At the close of the war resigned from navy and returned home. Given degree of A. M. by Bowdoin college. Taught in Litchfield academy, Maine, one year, and Houlton academy five years. Held chair of natural history, Maine state college, 1871-86; professor of

zoölogy, Mass. agricultural college, 1886 to date. Studied under Louis Agassiz on isle of Penekese, and travelled extensively in Europe, studying the insects in museums of various institutions. Member Boston society of natural history; Brooklyn entomological club; Nuttall ornithological club; Cambridge entomolgical society; Buffalo academy of natural sciences; American entomological society; Fellow of American association for the advancement of science. Address : Amherst, Mass.

PUBLICATIONS.

Grasses of Maine.
 Butterflies of Maine.
 Sphingidæ of New England.
 Orthoptera of New England.
 Catalogue of the North American Tortricidæ.
 Moths. *Standard natural history*, Boston, 1884.
 Numerous descriptive and biological articles in the *American naturalist*.

FITZGERALD, J. K.

Graduated at the Mississippi agricultural college with degree of B. S. Assistant in experimental agriculture, to the Arkansas agricultural experiment sub-station. Address : Texarkana, Ark.

FLINT, EDWARD R.

Born Sept. 8, 1864, at Boston, Mass. Public school education in Boston, and two years in Boston Latin school, graduating from English high school in same city. Graduated from Mass. agr. college in 1887 with degree of B. S.; since this time acting as assistant chemist to the Mass. state agricultural experiment station. Address : Amherst, Mass.

FORBES, STEPHEN ALFRED.

Born May 29, 1844, at Silver Creek, Stephenson county, Illinois. Educated at Beloit academy and Rush medical college. Received Ph. D. from Indiana state university.

Captain of cavalry in civil war. Curator Illinois museum of natural history, 1872-77, when it was converted into the Illinois state laboratory of natural history, of which he has since been director. Illinois state entomologist since 1882. Professor zoölogy in state normal university, 1875-78. Professor zoölogy and entomology university of Illinois, 1884, to date. President western society naturalists, 1887-88. Address: Champaign, Ill.

PUBLICATIONS.

Four reports as state entomologist of Illinois; a series of studies on the food relations of birds, fishes and insects; several articles on the contagious diseases of insects; and many other zoölogical and educational papers and addresses. Edited vols. I and III, Illinois state laboratory of natural history, and the report on ornithology of the natural history survey of Illinois, vol. I.

FRANCIS, MARK.

Born March 19, 1863, at Glendower, Ohio. Graduated from the Ohio state university in 1887, with degree D. V. M. Studied at American veterinary college, New York, 1887-88. Now veterinarian to the Texas agricultural experiment station. Address: College Station, Texas.

FREAR, WILLIAM.

Born March 24, 1860, in Reading, Penn. Early education in public schools of Reading and Norristown, Penn. Graduated at what is now Bucknell university, Lewisburg, Penn., in 1881 with degree of A. B. Special chemical study pursued at Harvard, 1881-82, and in 1883 completed post-graduate course Illinois Wesleyan university, receiving degree of Ph. D. A considerable part of the time during 1881-83 was spent in teaching in the scientific laboratories of the university at Lewisburg. In July, 1883, appointed assistant chemist in the United States department agriculture, where in addition to general analytical work, he engaged in researches upon American cereals, sugar production and methods of milk analysis. Appointed assistant professor of agricultural chemistry

in 1885, in Penn. state college, with duties including oversight of agricultural department of college, work of instruction in all the technical agricultural branches, and direction of agricultural experiment work. Was elected professor of agricultural chemistry in January, 1887, with duties as before, and in July, 1887, made vice-director and chemist of the experiment station organized under the Hatch act. Address: State College, Penn.

PUBLICATIONS.

Structure of the cell wall in the cotyledonary cells of the lima bean. *Amer. nat.*, 1883, p. 1282.

The elements in gluten determination. Read before chemical society of Washington, March 12, 1885. *Amer. chem. jour.*, vi, 6.

Report upon observations made in Vermont upon the chemistry and physiology of maple sugar production. Part iv, bull. 5, chem. div., U. S. dept. agric., 1885.

A method of indexing scientific literature. Appendix to report of committee on indexing chemical literature. *Amer. assn. for the adv. of science proceedings*, 1885, p. 34.

Feeding experiment on fattening steers with cottonseed and corn meal, corn fodder and hay. Bulletin 12, Penn. state college.

Fertilizer experiments with grass. Bulletin 14 Penn. state college.

Effects of different nitrogenous fertilizers on the proportion of clover to timothy in mixed hay. *Proc. soc. for the pro. of agr. science*, 1886, p. 74.

A comparison of Wagner's and the present "Association" methods for the determination of available phosphoric acid. With H. B. McDonnell. *Proc. third ann. conv. Amer. assn. official agr. chemists*. Bull. 12, chemical division, U. S. dept. of agr., p. 26.

The composition and food value of dessicated apple pomace. Bulletin 16, Penn. state college.

Report upon agricultural experiment work for 1885-86. Rept. Penn. state college, 1886, pp. 23-236.

Recent investigations on the nitrogen of soils and plants. *Agriculture of Penn.*, 1887, pp. 158-171.

Historical sketch of the agricultural experiments conducted by the Penn. state college, 1857-1887. Studies upon the composition and development of soiling crops. Bull. No. 1, Penn. state college agr. exp. station.

First annual report of the Penn. state college agricultural experiment station. (The portion describing the results of the experimental work for 1887.) 1888.

Digestibility of maize stover. *Agricultural science*, II, p. 149. With H. P. Armsby.

GEHRING, GUSTAV.

Born July 4, 1854, in Offingen, Württemberg. Early education in Munich and Ratisbonne. Came to America in 1873. Graduated at university of Missouri in 1881. Instructor in chemistry at alma mater one year, and held similar position two years in university of California. Then went to Paris and studied three years at the college of France under M. Berthelot and Paul Schützenberger. On his return to America was elected professor of physics and chemistry in the Pittsburgh Catholic college, remaining there until elected assistant chemist of the Missouri agricultural experiment station. Address : Columbia, Mo.

PUBLICATIONS.

Investigations on 11 organic compounds, heretofore unknown to chemistry, were presented to the Paris academy of sciences, and published in seven different communications in *Comptes rendus*, and in the *bulletin de la société chimique*.

GEORGESON, CHARLES C.

Born June 26, 1851, in Denmark. Attended private and public schools. From 1867-72 served a five years' apprenticeship in horticulture. Emigrated to America in 1873. Graduated from Michigan agricultural college in 1878 with degree of B. S., receiving M. S. from same in 1882. From 1878-80, associate editor *Rural New-Yorker*; 1880-83 professor of agriculture in Texas agricultural and mechanical college. At present professor of agriculture in the Imperial college of agriculture and dendrology, Tokio, Japan. Address : Tokio, Japan.

GOESSMANN, CHARLES ANTHONY.

Born June 13, 1827, at Naumburg, Hessen Cassel, Germany. Entered university of Göttingen, Germany, 1850, studying chemistry with Woehler and Wiggers, botany with Bartling, physics with Weber, mineralogy and geology under Walters, and technology with Hausmann. Received degree of Ph. D. in 1853. From 1852-57 assistant in chemistry under Woehler at university of Göttingen.

In 1855 appointed public lecturer (Private docent) for chemistry and pharmacy at the university. Secured a leave of absence of three years from university to study chemical industries of France, England and United States, having previously accepted from a former American fellow student, position of chemist and superintendent of a Philadelphia sugar refinery. Arrived at Phil. in May, 1857, and resigned in 1860 to go to Cuba, W. I., to study the sugar industry. From 1861-68 chemist of Onondaga salt works, Syracuse, New York. From 1862--64 was also professor of chemistry in Rensselaer polytechnic institute at Troy, N. Y. In 1868 elected professor of chemistry to Mass. agricultural college, which position still holds. Elected chemist to state board of agriculture, and in 1873 state inspector of fertilizers. Since 1884 has acted as analyst of Mass. state board of health. In 1882 appointed director and chemist of the Mass. state experiment station. Member of Physico-medical society of university of Erlangen, Germany; fellow American association for the advancement of science; honorary member N. Y. state agricultural society, and societies for promoting natural history, of New York City, Buffalo, etc., etc. Address: Amherst, Mass.

PUBLICATIONS.

The following contributions were published in *Annalen der Chemie u. Pharmacie*, von Wöhler, Liebig, u. Kopp.

1854. On palmitic acid; Bd. 89—H. 123. On Arachnidic acid, a new fatty acid; Bd. 89—I.—II. On the composition of the cocoa oil; Bd. 90—126. On benzo-glycolic acid from hippuric acid; Bd. 90—181. On a new method of procuring ethylamin; Bd. 90—122. On the constitution, etc., of leucine; Bd. 91—129.

1856. A new method of procuring amarine and lophine; Bd. 93—139. On hypogæic acid—a new acid in peanut oil; Bd. 94—230. On the combinations of arachnidic acid; Bd. 97—257. On the constitution of the lophine; Bd. 97—183. On the separation of coumarin; Bd. 98—86. On the separation of styracin; Bd. 99—376. On certain products from hypogæic acid, gaidic acid, etc. (with G. C. Caldwell); Bd. 99—305. On manganate of potassium as a suitable substance to decolorize uric acid, hippuric acid, etc.; Bd. 99—373. On a new method of procuring triphenylamine; Bd. 100—57. On the

action of zinc chloride on hippuric acid ; Bd. 100-69. On the crystallization of sulphocyanide of silver ; Bd. 100-76.

1857. On the action of iodide of ethyl on tungstate of silver ; Bd. 101-218. On a new mode of producing tricaprnylamine ; Bd. 101-31. On the transformation of nitrobenzol into aniline by means of arsenious acid and caustic potassa ; Bd. 102-127. On a new sugar plant, *Sorghum saccharatum* ; Bd. 104-335.

Contribution to the knowledge of the nature of the Chinese sugar cane. *Sorghum saccharatum*. Trans. N. Y. state agric. soc., 1861, p. 785.

Report on the chemical composition of the brines of Onondaga, N. Y. 1862, Syracuse.

Report on the brines of Michigan. Senate Rep., N. Y., 1862-63.

Report on the best mode of manufacturing coarse solar salt from the brines of Onondaga, Syracuse, 1863.

Contribution to the manufacture and refining of sugar ; or the application of caustic magnesia for sugar refining. Syracuse, 1864-65.

Notes and criticisms on the manufacture of sugar upon the island of Cuba. Syracuse, 1865.

Contribution to the chemistry of the mineral springs of Onondaga. Syracuse, 1866.

Report on the salt deposit of Petite Anse, Louisiana. Pub. by American bureau of mines. N. Y. 1867.

Contribution to the chemistry of brines. *Amer. jour. of sci.*, July and November, 1867.

Report on the salt resources of Goderich, Canada. Syracuse, 1868.

On the chemistry of common salt, with reference to our home resources. Read before National academy at Northampton meeting, 1869.

On salt and its uses in agriculture. Rep. Mass. state board of agriculture. Boston, 1870.

On the cultivation of the sugar beet-root as an agricultural enterprise. Rep. trustees Mass. agric. college, 1870.

On cheese as a food. Rep. Amer. dairymen's ass'n, Utica, 1870.

Rep. on the chemical composition of some dairy products. Annual rep. Mass. state board of agric., 1871-72, pp. 305.

On the Stassfurt potash compounds, and their present reputation in the agricultural industry of Europe. *Amer. chem.* July, 1872.

Rep. on the quality of the sugar beet-roots raised upon the farm of the Mass. agric. college, with regard to their fitness for sugar manufacture. *Amer. chem.*, 1872.

Contributions to the history of the beet sugar manufacture within the United States. *Amer. chem.*, 1872.

Contributions to the requirements for a successful home beet sugar industry. *Amer. chem.*, August and November, 1872.

On the fertilization of our farm lands with reference to the judicious application of mineral fertilizers. Jour. New York state agric. soc., January and February, 1873.

Report on commercial fertilizers, and their importance in present condition of agricultural industry. Tenth ann. rep. Mass. agric. college, 1873.

On nitrogen and the extent of the natural resources for agricultural purposes. Rep. Mass. state board of agriculture, 1873-74.

Results of the experiments with the cultivation of the sugar-beet roots throughout the state of New York, eastern Canada, and upon the college farm during the year 1873. College report 1873-74.

Report of the present condition of our resources of commercial concentrated fertilizers. First official report of state inspector. Amherst, Mass., 1874.

In addition to above papers, has since 1874 read many addresses before scientific associations and agricultural societies on agricultural and horticultural topics. Also has published official annual reports of Mass. experiment station, and state inspector of fertilizers, etc., etc., of work carried on for the state. Also contributed somewhat for the agricultural press.

GOFF, EMMETT S.

Born Sept. 3, 1852, at Elmira, New York. Studied in home schools. Graduated at Elmira free academy, 1869. Horticulturist to the New York agricultural experiment station from 1882 to 1889. In January, 1889, elected professor of horticulture to the university of Wisconsin, and horticulturist to the Wisconsin agricultural experiment station. Address: Madison, Wis.

PUBLICATIONS.

Writes occasionally for the agricultural press on horticultural subjects.

The relation of color to flavor in fruits and vegetables. *American naturalist*, 1884, pp. 1203+.

The temperature of the stem in plants as an index of the depth of root feeding. *Agricultural science*, 1887, pp. 134-7.

The influence of atmospheric pressure upon percolation. *Ibid.*, pp. 173.

The office of the seed tuber in the potato plant. *Ibid.*, 1888, pp. 25+.

GOODELL, HENRY HILL.

Born May 20, 1839, at Constantinople, Turkey. Fitted for college at Williston seminary, Easthampton, Mass., and graduated from Amherst college in 1862 with degree of A. B., receiving M. A., from same in 1865. Professor of modern languages and English literature in the Mass. agric. college from 1867 to date, and president of same institution from 1886 to date. Since 1888 director of the Hatch agricultural experiment station of the Mass. agric. college. Address : Amherst, Mass.

GRANGE, E. A. A.

Graduated from the Ontario veterinary college, Toronto, Canada, in 1873, with degree of V. S., and for three years was demonstrator in anatomy there. For eight years professor of veterinary at the Ontario agricultural college, being in the meantime provincial inspector of live stock, and veterinary surgeon to the Wellington field battery and brigade. In 1881 visited England and Scotland to inspect veterinary colleges there. In 1883 elected temporary professor of veterinary science at Mich. agr. college, and in 1885 permanently so. Since July, 1885, has been Michigan state veterinarian. Is also veterinarian to the Mich. agr. exp. station. Address : Agricultural College, Mich.

GREEN, SAMUEL B.

Born in 1859. Graduate of grammar schools of Chelsea, Mass., and of the Mass. agr. college in 1879, receiving degree of B. S. from latter, and during 1881-82 studied there. Foreman, Chas. M. Beach's farm, Hartford, Conn., 1879-80. With James J. H. Gregory, seedsman, Marblehead, Mass., 1881. Supt. horticultural department, Houghton farm, Mountainville, N. Y., 1882-85. Foreman, Wm. C. Strong's nurseries, Brighton, Mass., 1885-86. Supt. horticultural department, Mass. agr. college, 1886-88. At present professor of horticulture at the university of Minnesota, and horticulturist to the Minn. agr. exp. station. Address : St. Anthony's Park, Minn.

GRIFFIN, HARVEY H.

Graduate Colorado agricultural college, 1888, with degree of B. S. Now in charge of San Luis valley auxiliary experiment station, Del Norte, Colorado.

GRIMM, E.

Born in 1855 in Marion county, Oregon. Educated in common schools till 1876. Graduated at Oregon state agricultural college, at Corvallis, in 1880, with degree of B. S. Studied at Mich. agr. college 1882-83, receiving degree of B. S. Special student at university of Illinois in 1883. Elected to chair of agriculture in Oregon agricultural college in June, 1883, which position he has held since. In June, 1888, appointed director of Oregon state agricultural college agricultural experiment station. Address : Corvallis, Oregon.

GRISSOM, ROBERT GILLIAM.

Born Jan. 26, 1867. Graduated at the university of North Carolina in 1887 with degree of B. S. Third assistant chemist at the North Carolina agricultural experiment station, being appointed March 9, 1888. Address : Raleigh, N. C.

GULLEY, F. A.

Born April 24, 1851, at Dearborn, Wayne county, Michigan. Graduated from Michigan agricultural college in 1880 with degree of B. S., and for post-graduate work received M. S. in 1883. From 1880-88, professor of agriculture in Miss. agricultural and mechanical college. Now director Texas agricultural experiment station. Fellow American association for the advancement of science, and member the Association for the promotion of agricultural science. Address : College Station, Texas.

PUBLICATIONS.

First lessons in agriculture, 1887, pp. 118.

HALSTED, BYRON, D.

Born June 7, 1852, at Venice, Cayuga county, New York. Educated in district school until 1867. Gradua-

ted at Michigan agricultural college with degree of B. S., in 1871. After teaching at same college, and studying two years, received degree of M. S. Studied at Harvard university four years, receiving degree Sc. D. in 1878. Taught in Chicago high school six months, and then took place on *American agriculturist* in New York as associate editor; was managing editor from 1882-85. From 1885 to 1889 professor of botany in Iowa agricultural college. Since then professor of botany in Rutgers college, and botanist and horticulturist to the New Jersey agricultural experiment station. Address: New Brunswick, N. J.

PUBLICATIONS.

Has written many hundreds of articles for the agricultural press, and several papers for journals like *Popular science monthly*, *Science*, *American naturalist*, *Botanical gazette*, *Torrey bulletin*, etc. Edited some books while with *American agriculturist*, and compiled others. Has published two annual bulletins of department of botany of Iowa agricultural college.

HALTER, GEORGE L.

Born July 2, 1859, at Roland, Centre county, Penn. Early education at district school at Curtin's iron works. Graduated from Pennsylvania state college, in chemistry and physics, 1886, with degree of B. S. Assistant in chemical laboratory Penn. state college, 1886-87. Appointed second assistant chemist Penn. state college agr. exp. station, early in 1888, promoted to first assistant chemist July 1, 1888, which position he now holds. Address: State College, Penn.

HARPER, DAVID NEIL.

Born 1863 at Scotch Grove, Jones county, Iowa. Early education at Cumberland Valley state normal school, Shippensburg, Penn. and Dr. Holbrook's military academy at Sing Sing, New York. Graduated from Sheffield scientific school of Yale university, with degree of Ph. B. Was instructor in chemistry at university of Pennsylvania. Now chemist to the university of Minnesota agricultural experiment station. Address: St. Anthony's Park, Minn.

HARRINGTON, H. H.

Born Dec. 14, 1859, at Buena Vista, Miss. Graduated from Miss. agricultural and mechanical college in 1883, with degree of B. S., and in 1885 received M. S. from same, for post-graduate work. Studied at Michigan agricultural college in 1882, and at the Conn. agricultural experiment station in 1885. Assistant chemist Miss. agricultural and mechanical college, 1883-88. Now professor of chemistry at the Texas agricultural and mechanical college, and chemist to the Texas agricultural experiment station. Member American association for the advancement of science. Address: College Station, Texas.

HARTER, GEORGE A.

Born in 1854, at Hagerstown, Maryland. Graduated in 1878 from St. John's college, Annapolis, Maryland. Has been tutor in mathematics at St. John's college and principal of Hagerstown Academy. Is now professor of mathematics and physics in Delaware college, and meteorologist to the Delaware agricultural experiment station. Address: Newark, Delaware.

HARVEY, FRANCIS LE ROY.

Born in 1850 in Tompkins county, New York. Early education in Ithaca, N. Y., public schools. Moved to Iowa in 1865. Teacher in Iowa public school in 1867. Graduated Iowa agricultural college in 1872 with degree of B. S. Received M. S. degree from same college in 1886. For two and one-half years assistant in chemistry, entomological curator for the natural history society, at Iowa agricultural college. Post-graduate course in botany, and special student in mineralogy and geology at Harvard university. Taught one year in graded schools of Iowa. Occupied chair of sciences at Humboldt college, Iowa, one year. From 1875-81 held chair of theoretical and applied chemistry and biology in the Arkansas industrial university; and from 1881-85 chair of biology, mineralogy and geology at same institution. In 1885 in charge of Dr. A. E. Foote's natural history and mineral establishment at Phila-

delphia, Pa. In 1887 elected to the chair of natural history in the Maine state college, and in 1888 also made botanist and entomologist to the Maine agricultural experiment station. Member academy of natural sciences of Philadelphia, Pa., corresponding member Torrey botanical club, and the Portland society of natural history. Address : Orono, Maine.

PUBLICATIONS.

Special bulletin No. 12 on the forestry of Arkansas, vol. ix, U. S. census report, 1880.

List of the forest trees of Arkansas.

List of the ferns of Arkansas, with notes.

Minerals and rocks of Arkansas.

Has contributed many notes and short articles, during the past ten years, to scientific periodicals.

HAYS, WILLET M.

Born in October, 1859, at Eldora, Iowa. Educated in public schools in county. Attended Oskaloosa college and Drake university, irregularly from 1878-82. Graduated at Iowa agricultural college in 1885 with degree of B. S. A. Assistant in agricultural experiments in Iowa agricultural college, 1886. Associate editor *Prairie farmer*, 1887-88. At present assistant in agriculture at Minnesota agricultural experiment station. Address : St. Anthony's Park, Minn.

HAYWARD, ALBERT I.

Graduated at Mass. agricultural college in 1888 with B. S. degree. Senior assistant in agricultural department, Mass. agr. college, 1887-88. Agriculturist, Maryland agricultural experiment station from July 16, 1888, to date. Address : Agricultural college, Md.

HENRY, W. A.

Born June 16, 1850, at Norwalk, Ohio. Student at Ohio Wesleyan university, 1869-70. In charge, New Haven, Indiana, graded public schools, 1871-72, and Boulder, Colorado, schools 1873-76. Graduated from Cornell university in 1880, with B. agr. degree. Ap-

pointed professor of botany and agriculture, university of Wisconsin, in 1880, and professor of agriculture in 1882. In 1887 made director of Wisconsin agricultural experiment station. Address : Madison, Wis.

PUBLICATIONS.

In various agricultural journals, and in bulletins and reports of the Wisconsin agricultural experiment station. At present staff correspondent of *Breeder's gazette*, Chicago, Ill.

HERFF, B. A. VON

Born at Worms, Germany. Graduated from university of Göttingen, with degree of Ph. D. First served as chemist to the Ascarnia manufacturing company, at L'halt, Stassfurt, Germany. Next chemist to North Carolina experiment station. Now assistant chemist to Mississippi agricultural experiment station. Address : Agricultural College, Miss.

PUBLICATIONS.

About the action of oxalic acid on orthonitraniline, Berlin, 1881.

About phtalylparatoluidine. Berlin, 1881.

The Stassfurt industry. Raleigh, N. C., 1883.

HICKMAN, J. F.

Born July 3, 1856, at East Liverpool, Ohio. Studied in public schools of native home during the winters, till 1875, when entered preparatory department Penn. state college. Graduated from same in 1880. From 1881-83, superintendent of the eastern experimental farm, Penn. state college, West Grove, Pa. In 1883 farmer and sheep grower at East Liverpool, Ohio. Since 1888 agriculturist to the Ohio agricultural experiment station. Has degree of M. A. S., conferred in 1883. Address : Columbus, Ohio.

HICKS, LEWIS EZRA.

Born in 1837 at Kalida, Ohio. Educated in Denison university, Granville, Ohio, graduating in 1868 as A. B. Also studied at Harvard university and in Agassiz's museum, 1869-70. Degrees of A. M. and Ph. D. From 1870

-84 professor of natural science Denison university. Prof. of geology university of Nebraska, 1884 to date. Geologist to university of Nebraska agric. experiment station, 1887 to date. Dean industrial college, university of Nebraska, 1888 to date. Associate editor *American geologist*, 1888 to date. Address : Lincoln, Neb.

PUBLICATIONS.

Numerous editorials in *American geologist*. Before Amer. assn. for adv. of science : The Dakota group in Nebraska, Ann Arbor, 1885 ; the permian in Nebraska ; some typical well sections ; preliminary geological map of eastern Nebraska ; the Lincoln salt basin, Buffalo, 1886.

The Niobrara river considered with reference to irrigation. Vol. I, No. 2, *American geologist*.

The reef-builders, I, 5. Ibid.

The soils of Neb. in relation to geological structure, with a geological map of Nebraska. State horticultural society, 1888.

Irrigation in Nebraska. Bull. I, agric exp. station.

Critique of design arguments, Scribners, 1883.

HILGARD, EUGENE W.

Born on January 5, 1833, in Zweibruecken, Rheinisch Bavaria. His parents early in life emigrated to a farm near Belleville, Ill., where the son received his schooling from his father. In 1849 he went to Europe and studied at Heidelberg, Zurich, and the Academy of mines at Freiburg in Saxony. Secured degree of Ph. D. in 1853 at Heidelberg. Spent three years in Spain and Portugal, and returned to America in 1855, to take charge of the chemical laboratory of the Smithsonian institution, and lecture on chemistry at the National medical college. Appointed chief geologist to state of Mississippi in 1858. Married in 1860, in Madrid, Spain, to the daughter of a Spanish general. During the civil war was assigned to duty in preserving the collections at the university of Mississippi, and also carried on scientific research. At the close of the war resigned his place as geologist to become professor of chemistry in Mississippi university. In 1868 accepted chair of geology and natural history in the university of Michigan, but resigned in 1875 to go to the uni-

versity of California to become professor of agriculture and chemistry. Upon its establishment, became director of the agricultural experiment station of the university of California. Is a member of the National academy of sciences, and other societies. Given degree of LL. D. by university of Mississippi in 1884. Address: Berkeley, California.

PUBLICATIONS.

Beitrag fur Kenntniss der Lichtflamme. Inaugural Dissertation; Heidelberg, 1854; 49 pp., 8vo.—*Ann. Chem. and Pharm.*, vol. xcii, p. 129.

On the quantitative assay of chromium by blowpipe processes.—In full: *Proc. amer. ass'n adv. sci.*, 1857; 22 pp.—In abstract: *Am. jour. sci.*, September, 1857; 8 pp.

Report on the condition of the geological and agricultural survey of the state of Mississippi. Jackson, Miss., 1858; 22 pp.

Report on the geology and agriculture of the state of Mississippi. Jackson, 1860; 391 pp., and map.

On the quaternary formations of the state of Mississippi.—*Am. jour. sci.*, May, 1866; 15 pp.

Remarks on the new division of the eocene, or Shell Bluff group, proposed by Mr. Conrad.—*Am. jour. sci.*, July, 1866; 4 pp.

Remarks on the drift of the western and southern states, and its relations to the glacier and iceberg theories.—*Am. jour. sci.*, November, 1866; 5 pp.

On the tertiary formations of Mississippi and Alabama.—*Am. jour. sci.*, January, 1876; 12 pp.

On the geology of lower Louisiana and the rock salt deposit of Petite Anse Island.—*Am. jour. sci.*, January, 1869; 6 pp.

On the condition of our knowledge of the processes in luminous hydrocarbon flames.—*Proc. am. ass'n for the adv. sci.*, 1868; *Am. jour. sci.*, vol. 47, No. 140, p. 218; 5 pp.

Preliminary report to the New Orleans academy of sciences of a geological reconnoissance of Louisiana.—*DeBow's review*, September, 1869; 15 pp.

Summary of results of a late geological reconnoissance of Louisiana.—*Am. jour. sci.*, November, 1869; 16 pp.

Report on the geological age of the Mississippi delta.—Rep. U. S. Eng. dep't for 1870; 16 pp.

On the maintenance of fertility in soils.—*Rural Carolinian*, for November and December, 1870; 12 pp.

On the geology of the delta and the mudlumps of the passes of the Mississippi.—*Am. jour. sci.*, third series, vol. I; 34 pp.

On the geological history of the gulf of Mexico.—*Proc. Am. ass'n*

adv. sci., 1871 ; *Am. jour. sci.*, December, 1871 ; *Am. naturalist*, Assn. number, 1871.

Report on the organization of the department of agriculture and the mechanic arts in the university of Mississippi. Oxford, Mississippi, August, 1871 ; 8 pp.

Memoir on the geology of Louisiana and the rock salt deposit on Petite Anse Island. With plates and diagrams.—*Smithsonian contr. to knowledge*, vol.— ; 34 pp., 1ge. 4to. (No. 248.)

On some points in the geology of the southwest.—*Am. jour. sci.*, October, 1872 ; 4 pp.

On soil analyses and their utility.—*Am. jour. sci.*, December, 1872 ; *Proc. Am. ass'n for adv. sci.*, 1872 ; 10 pp.

On the silt analyses of soils and clays.—*Am. ass'n adv. sci.*, 1873 ; *Am. jour. sci.*, October and November, 1873 ; 9 pp.

Silt analyses of Mississippi soils and subsoils. *Ibid.*, p. 71 ; *Am. jour. sci.*, January, 1874 ; 9 pp.

Supplementary and final report of a geological reconnoissance of the state of Louisiana. New Orleans, 1873 ; 44 pp., 8vo.

Address on progressive agriculture and industrial education delivered at the Mississippi state fair, November 14, 1873 ; 31 pp.

Note on Lignite beds and their underclays.—*Am. jour. sci.*, March, 1874 ; 3 pp.

On Mallet's theory of vulcanicity.—*Am. jour. sci.*, June, 1874 ; 11 pp.

On the study of natural science in the common schools.—*Michigan teacher* for March, 1874.

Articles on "artesian wells," "vine culture," "wines and wine-making," in *Johnson's universal cyclopedia*, 1875.

Lecture on the Phylloxera or vine louse, delivered at San Francisco, Nov. 23, 1875.—*University press*, Berkeley, Cal., 24 pp.

Circular concerning an industrial survey, transmission of soil specimens, etc.—*Bulletin No. 26* of the univ. of California, April, 1877. 6 pp. 8 vo.

(First) Report to the president of the university of California, on the work of the agricultural department, December, 1878. 63 pp. 8 vo.

On the destruction of the ground squirrel by the use of bisulphid of carbon.—*Bulletin No. 32*, univ. of Cal., April, 1878. 6 pp. 8 vo.

On the flocculation of particles, and its physical and chemical bearings.—*Am. jour. sci.*, February, 1879. In translation : *Forschungen auf dem Gebiete der Agriculturphysik*, 1879. 10 pp. 8 vo.

Report on the borings made between lake Borgne and the Mississippi river, in 1874, at the site proposed as an outlet for floodwaters.—*Report of the U. S. engineer department*, 1877 ; publ. 1878. 49 pp., 8vo., with maps and plates.

(Second) Biennial report of the department of agriculture of the university of California. Sacramento, 1879. 113 pp., 8vo.

The loess of the Mississippi valley and the Aeolian hypothesis.—*Am. jour. science*, August, 1879; 8 pp., 8vo.

The agriculture and soils of California.—*Report of the U. S. department of agriculture for 1878*; 30 pp. 8vo.

Physical geograpy of the state of Mississippi. Cincinnati 1880, 10 pp., 4to., and maps, in eclectic series, Van Antwerp, Bragg & Co.

Lecture on "The permanent maintenance of our vineyards." Delivered at St. Helena, December 18, 1880.

(Third) Report of the department of agriculture of the university of California. 42 pp. 8vo. Sacramento, 1881.

The later tertiary of the gulf of Mexico.—*Am. jour. sci.*, July, 1881; 8 pp., 8vo., with colored geol. map.

The objects and interpretation of soil analysis.—*Am. jour. sci.*, September, 1881; 15 pp. 8vo.

Progress in agriculture by education and government aid.—*Atlantic monthly* for April and May, 1882; 22 pp.

Report on the climatic and agricultural features and the agricultural practice and needs of the arid regions of the Pacific slope. Made under the direction of the commissioner of agriculture, by E. W. Hilgard, J. C. Jones and R. W. Furnas, commissioners. Washington, 1882; 182 pp.

(Fourth) Report of the department of agriculture of the university of California, Sacramento, 1882; 179 pp.

Einige Bemerkungen ueber die Schlaemmanalyse.—*Wollny's Forschungen auf dem Gebiete der Agricultur Physik*. vol 6, p. 52, 4 pp.

Report on the cotton production of the United States, according to the tenth census. 2 vols., embracing, as personal work, apart from editorial :

(a) Report on the cotton production and agricultural features of the state of Louisiana. 100 pp. 4to., two colored maps.

(b) Report, etc., of the state of Mississippi. 120 pp., 4to., two maps.

(c) Report etc., of the state of California. 131 pp., two maps.

(d) General discussion of the results of the tenth census, as regards cotton production in the United states. 69 pp., 4to.

Report of Prof. E. W. Hilgard and F. V. Hopkins, upon the examination of specimens from borings on the Mississippi river, between Memphis and Vicksburg. Rep. Miss. river commission for 1883, p. 479. 19 pp. 8vo.

The salines of Louisiana.—U. S. Geolog. survey rept. on the mineral resources of the U. S. 1883. Pp. 554.

The asphaltum deposits of California. *Ibid.*, 1884, 10 pp.

(Fifth) Report college of agriculture university of Cal. Sacramento, 1884, 111 pp.

Report on the agricultural features of eastern Washington Territory. *The Northwest*, 1884. St. Paul.

Über die Bedeutung der hygroskopischen Bodenfeuchtigkeit für die Vegetation. *Forsch. auf. d. Gebiete d. Agricultur physik*, viii, 1885, p. 93-100.

The old tertiary of the south-west.—*Amer. jour. sci.*, xxx, October, 1885, pp. 266-70.

On some redeeming features of alkali soils. *Proc. soc. for pro. of agr. sci.*, 1885.

Report of viticultural work during seasons 1883-4, 1884-5, with notes on the vintage of 1885-6. Appendix. Rep. coll. of agr. univ. of Cal., for 1884. Sacramento, 1886, 210 pp. 8°.

Hist. outline of the geological survey of the state of Mississippi. U. S. Geolog. survey, 1886.

Hist. outlines of the geological survey of the state of Louisiana. *Ibid.*

The beet sugar industry in California. *Overland monthly*, December, 1886.

Rep. on viticultural work done during seasons 1885 and 1886 at viticultural lab. univ. of Cal. Sacramento, 1886, 150 pp.

On alkali soils, and their relation to irrigation. Sacramento, 1886. 25 pp.

(Sixth) Rep. on exp. work of college of agr. of univ. of Cal. Sacramento, 1886.

The methods of mechanical soil analysis. *Proc. society for the promotion of agricultural science*, 1887, p. 48-51.

The processes of soil formation from north-western basalts. *Ibid.*, p. 51-63.

The mutual reaction of carbonates, sulphates and chlorides on the alkaline earths and alkalies. *Ibid.*, 1888, pp. 40-46.

HILLS, JOSEPH L.

Born March 2, 1861, at Boston, Mass. Studied at Boston Latin school, 1874-77. Graduated at Mass. agr. college in 1881, with degree of B. S., and post-graduate at same from 1881-84. Assistant chemist Mass. agr. experiment station, 1882-83. Assistant chemist New Jersey agr. exp. station, 1884-85. Chemist to phosphate mining company and Port Royal fertilizer company, 1885-88. Chemist to Vermont agricultural experiment station, 1888 to date. Address: Burlington, Vt.

HOWARD, LELAND O.

Born June 11, 1857 at Rockford, Illinois. Removed to Ithaca, N. Y., 1858. Educated at Ithaca academy and Cornell university, graduating at the latter in 1877 with degree of B.S. From June, 1877, to Sept., 1878, post-graduate student in chemistry and comparative anatomy. November, 1878, appointed assistant in entomological division, U. S. department of agriculture, Washington, D. C. Received degree of M. S. from Cornell university, 1883. From 1884 to date first assistant entomologist to department of agriculture, Washington. Address: Dept. of agriculture, Washington, D. C.

PUBLICATIONS.

Report on the parasites of the Coccidae.

Report U. S. commissioner of agriculture, 1880.

List of the invertebrate fauna of South Carolina, Charleston, 1883.

Hymenoptera, Chapter on. *Standard natural history*, Boston, 1884.

Descriptions of North American Chalcididæ, etc. *Bull. No. 5, div. of entomology, U. S. dept. agr.*, 1885.

Generic synopsis of the Hymenopterous family Chalcididæ. *Entomologica Americana*, 1885-6.

Generic synopsis of the Proctotrupidæ. *Trans. Am. entomological society*, 1886.

The chinch bug. *Bulletin No. 17, div. of entomology, U. S. dept. agric.*, 1888.

The codling moth. *Rep. com. of agr. for 1887*.

The morphology of the Chalcididæ. *Proc. entomological society of Washington*, 1888.

Shorter articles published in reports of the commissioner of agriculture, *Canadian entomologist*, *American naturalist*, *Psyche*, *Science*, *Entomologica Americana*, *Insect life* and various agricultural newspapers.

HUNT, THOMAS F.

Born Jan. 1, 1862, at Ridott, Ill. Educated in public school at home, and in Freeport high school. Graduated from university of Illinois in 1884 with degree of B. S. Acted as assistant to Illinois state entomologist, 1885-6. Assistant in agriculture, university of Illinois, 1886-8 ;

assistant agriculturist to agricultural experiment station, university of Illinois, 1888 to date. Address: Champaign, Ill.

PUBLICATIONS.

Bibliography of insects injurious to corn, in miscellaneous essays on economic entomology. Illinois state board of agriculture report, 1885, pp. 57-126.

Farm papers. 13th report board trustees univ. of Ill., 1886, pp. 196, 204-6.

On the moisture of soil and its relations to tile drainage and to cultivation. University of Ill., bulletin No. 3, pp. 40-887.

Experiments in feeding pigs, winter of 1886-7. Univ. of Ill., bulletin No. 4, pp. 41-57.

Ensilage. Agric. exp. station, university of Ill., bulletin No. 2, Aug., 1888.

HUSTON, HENRY A.

Born April 20, 1858, at Damariscotta, Maine. Educated in the public schools of native home, and Lincoln academy. Graduated at Bowdoin college in 1879 with degree of B. A., in 1882 receiving M. A. Assistant under Professor Carmichael at Bowdoin, chemical department, 1879-80. Post-graduate chemical work under Dr. Wiley at Purdue university, 1881-82. Science teacher in Lafayette, Indiana high school, 1880-82, and principal 1882-84. Professor of physics to Purdue university and acting state chemist, 1884-87, and now state chemist. Director Indiana state weather service, 1884 to date. Address: Lafayette, Indiana.

PUBLICATIONS.

Influence of time and temperature on the solubility of reverted phosphoric acid. 1882.

Report of Indiana weather service, 1883.

HUTCHINSON, W. L.

Born June 26, 1860, at Shadyside, Harris county, Georgia. Educated at the Alabama polytechnic institute and the agricultural and mechanical college, receiving B. S. from the latter in 1884. Was first assistant chemist in

the state laboratory of Alabama. Later, assistant director Louisiana sugar experiment station. At present professor of chemistry to the Mississippi agricultural and mechanical college; chemist to the state agricultural experiment station and Mississippi state chemist. Address: Agricultural College, Miss.

INGERSOLL, C. L.

Born Nov. 1, 1844, at Perry, Wyoming county, New York. Educated in the public schools of New York and Michigan until 1862. In U. S. army from March, 1863 to Aug., 1865. Graduated from Michigan agricultural college in 1874 with degree of B. S., receiving M. S. in 1875 for post-graduate work at same. From 1875-77 assistant in agriculture and from 1877-79 in chair of agriculture, Mich. ag. college. From 1879-82, professor of agriculture and horticulture, Purdue university. President Colorado state agricultural college since August, 1882, and director Colorado agricultural experiment station since March, 1888. Address: Fort Collins, Colo.

IRISH, PERRY HERBERT.

Born March 12, 1864, at New York City, N. Y. Graduated from Amherst college with A. B., and secured Ph. D. at University of Göttingen, Germany, in 1888. Has acted as private assistant to Prof. E. P. Harris of Amherst college. Now professor of chemistry in the Oregon agricultural college and chemist to the Oregon agricultural college experiment station. Address: Corvallis, Oregon.

JAFFA, MYER EDWARD.

Born October 6, 1857, at Sidney, Australia. Graduated at university of California, 1877, with degree of Ph. B. Post graduate course in university in chemistry, mineralogy and metallurgy, 1877-80. Analyzed soils for tenth census of the United States, from January to August, 1880. Assistant in agricultural laboratory in university of California from August, 1880, to August, 1881.

Did chemical and clerical work for the northern trans-continental survey under the direction of Prof. Hilgard, university of California, from August, 1881, to August, 1883. Assistant in viticultural department of university of California from August, 1883, to August, 1885. First assistant in viticultural department, university of California, from August, 1885, to date. Address: Berkeley, California.

JENKINS, EDWARD HOPKINS.

Born in 1850. Graduated at Yale college in 1872 as B. A., and received Ph. D. from same institution in 1879. Pursued graduate course in analytic and agricultural chemistry at Sheffield scientific school of Yale, from 1872-75. Studied in Leipzig university, 1875-76. Chemist to agricultural experiment station, Middletown, Conn., 1876-77, and from latter date to present time chemist to Connecticut agricultural experiment station, at New Haven, and since 1883 vice director of same. Address: New Haven, Conn.

JOHNSON, SAMUEL.

Born July 7, 1839, at Springfield, Otsego county, N. Y. Educated in district schools, and at Cazenovia seminary. Moved to Dowegiac, Mich., in 1862, and engaged in farming. Has held various township offices. Since 1880, professor of agriculture in the Mich. agr. college, and since 1888, agriculturist to the experiment station at that college. Address: Agricultural College, Mich.

JOHNSON, SAMUEL WILLIAM.

Born July 3, 1830, at Kingsboro, Fulton county, New York. Studied at Yale scientific school, and at universities of Leipzig and Munich. In 1856 became professor of analytical and agricultural chemistry at Sheffield scientific school at Yale. Member of National academy of sciences, and American academy of arts and sciences. Is director Connecticut agricultural experiment station. Address: New Haven, Conn.

PUBLICATIONS.

Essays on manures. 1859.

Peat and its uses. 1866.

How crops grow. 1868.

How crops feed.

Translated Fresenius' Qualitative chemical analysis and the work on quantitative chemical analysis by the same author. Has also written many articles for agricultural papers, and bulletins and reports of the Connecticut agricultural experiment station.

JONES, W. L.

Born in 1827, in Liberty county, Georgia. Educated in a private school in Liberty county, in the university of Georgia, the college of physicians and surgeons at New York, and Lawrence scientific school at Harvard university, Cambridge, Mass. Has degrees of A. M., B. S., and M. D. Has been professor of natural history, chemistry and geology in the university of Georgia; and editor of the *Southern cultivator* and *Southern farmer*. Is now director of the Georgia agricultural experiment station, and professor of agriculture in the university of Georgia. Address: Athens, Georgia.

JORDAN, G. LEE.

Graduate of Louisiana state university. Assistant and chemist, to the North Louisiana agricultural experiment station. Has degree of B. S. Address: Calhoun, La.

JORDAN, WHITMAN H.

Native of Maine. Graduated from Maine state college in 1875 with degree of B. S. Post-graduate student at Cornell university in chemistry and physics in 1877-8. Assistant in experimental and analytical work at Wesleyan university in 1878-9. During 1879-80, instructor in agriculture at the Maine state college. From 1881-85 professor of agriculture and agricultural chemistry at Penn. state college. Since April, 1885, director Maine agricultural experiment station. Has degree of M. S. Address: Orono, Maine.

KEDZIE, ROBERT C.

Born Jan, 28, 1823, in Delhi, New York. Moved to Michigan 1826. Graduated from Oberlin college in 1847, receiving A. M. degree in 1864. In charge of Rochester academy for two years after graduating. Graduated from medical department of Michigan university in 1851, with M. D. degree. Practiced medicine for a time, and enlisted in U. S. army in 1862 as surgeon in 12th Mich. infantry. In January, 1863, appointed professor of chemistry in Michigan agricultural college, which position he has since held. In 1872 appointed member state board of health. Since 1873 has been active member American public health association, and its president in 1882. Fellow of American academy of medicine; American association for the advancement of science, and member of the American meteorological society, and the society for the promotion of agricultural science, of which he was president, 1887-88. Since 1888, chemist to the Michigan agricultural experiment station.

PUBLICATIONS.

Use of poisons in agriculture. *Rep. Mich. state board of health*, 1875.

Relative value of different varieties of Michigan wheats. 1877.

Comparative food value of certain varieties of Indian corn, and certain mill stuffs. 1878.

Salt in agriculture. 1879.

Comparative food value of sound and "yellowed" peaches. 1880.

Composition of wheat at different periods of ripening. 1881.

Source of nitrogen of plants. 1882.

KELLERMAN, WILLIAM A.

Born May 1, 1850, at Ashville, Ohio. Educated at Fairfield academy, Pleasantville, Ohio; Cornell university, Ithaca, N. Y., where he was given the degree of B. S., and at universities of Göttingen, Germany, and Zürich, Switzerland, receiving Ph. D. from the latter. Was professor of natural sciences five years at the Wisconsin state normal school at Oshkosh. Professor of botany, horticulture, etc., one year in Kentucky state agricultural and

mechanical college. For five years professor of botany and zoölogy in Kansas state agricultural and mechanical college, and at present holds chair in botany at same institution. Is botanist to the Kansas state board of agriculture, and to the Kansas agricultural experiment station. Address : Manhattan, Kan.

PUBLICATIONS.

Entwicklungsgeschichte der Blüthe von *Gunnera Chilensis*.

Elements of botany, pp. 360.

Plant analysis, pp. 250.

Kansas forest trees identified by leaves and fruit, pp. 16.

Analytical flora of Kansas, pp. 200.

Editor of the *Journal of mycology*, from 1885-88.

Has written various articles descriptive of new species of fungi, and diseases of plants caused by parasitic fungi, etc., published in the reports of the Kansas state board of horticulture, and elsewhere.

KILBORNE, FRED LUCIUS.

Born Oct. 7, 1858, in Onondaga county, New York. At six years removed to a farm in Cayuga county, N. Y. Attended district school from six to 10 years of age, and from 10 to 13 years old went to same in winter, and worked on home farm in summer. From 13 to 15 years in winter attended public schools of Syracuse, N. Y., and from 15 to 19 years the Moravia union school, Moravia, N. Y., in meantime spending vacations and summers on the farm. Graduated at Cornell university in 1881 with degree of B. Agr. In 1885 was given B. V. S. by same institution. From 1881-85 was anatomical preparator in vertebrate zoölogy and microscopy, and special assistant and instructor in botany, physiology and zoölogy at Cornell university. Is now director of the veterinary experiment station, bureau of animal industry, United States department of agriculture, to which he was appointed in 1885. Since 1887 consulting veterinarian of Washington humane society ; and lecturer on the comparative anatomy of domestic animals and veterinary science and practice, at the Maryland state agricultural college, being appointed in 1888. Address : Washington, D. C.

PUBLICATIONS.

Since 1886 has been veterinary correspondent to the *Rural New-Yorker*, and occasional contributor to agricultural and stock journals.

KNORR, AUGUSTUS E.

Graduated at Zurich polytechnicum and Columbian university. Assistant chemist in general agricultural analyses, U. S. department of agriculture. Address: Washington, D. C.

LADD, E. F.

Born Dec. 13, 1859, at Starks, Maine. School education home, and at Somerset academy, Athens, Maine. Graduated from Maine state college in 1884 with degree of B. S. From 1884-87, assistant chemist to New York agricultural experiment station, but since 1888, chemist to same. Address: Geneva, N. Y.

PUBLICATIONS.

Composition and relative digestibility of feeding stuffs. *Amer. chem. jour.*, viii, 1.

Pepsin vs. animal digestion. *Ibid.*, viii, 6.

Sugars and starch in fodders, and their determination. *Ibid.*, x, 1.

The influence of food on the composition of butter. *Agricultural science*, 1888, pp. 251+.

LAMPSON, H. H.

Born in 1861 in Vermont. Graduated at Dartmouth medical college in 1887. Now botanist and microscopist to the New Hampshire agricultural experiment station. Address: Hanover, N. H.

LATTA, WILLIAM C.

Born March 9, 1850, at La Porte, Indiana. Educated in public schools home. Graduated from Mich. agric. college in 1877 with degree of B. S., receiving M. S. from same college in 1882. Foreman horticultural department, 1880, and in 1881 assistant in field and feeding experiments at same college. Professor of agriculture and horti-

culture, and superintendent of farm, Purdue university, 1882-84. Director Indiana state weather service, 1883. Professor of agriculture and superintendent of Purdue university farm, 1884 to date, and in charge of experimental agriculture at experiment station of same college since 1888. Address: Lafayette, Ind.

PUBLICATIONS.

Reports and bulletins of agricultural experiments, 1882-88.

LEE, J. G.

Graduate of Louisiana state university. In charge of diffusion work in Louisiana sugar experiment station. Has degree of B. S. Address: Kenner, La.

LINTNER, JOSEPH ALBERT.

Born Feb. 8, 1822, in Schoharie, N. Y. Graduated at Schoharie academy in 1837. Then went to New York city and engaged several years in mercantile pursuits, in meantime continuing literary and scientific studies. In 1848 returned to Schoharie and engaged in general mercantile business, at the same time beginning entomological studies. In 1860 removed to Utica, N. Y., and engaged in manufacture of woolen goods till 1867. Removed to Albany, N. Y., in 1868 to become zoölogical assistant in N. Y. state museum of natural history, holding same position 12 years, in meantime giving much attention to entomology. In 1880 was appointed New York state entomologist by Gov. Cornell, which position he still holds. The regents of the university of New York in 1884 gave him degree of Ph. D. Address: Capitol building, Albany, N. Y.

PUBLICATIONS.

From 1863 to 1888, the titles of entomological writings number 471. Entomological contributions I-IV, published 1869-70-72-76, number 380 pp.

First annual report N. Y. state entomologist, 1882, pp. 381. Second ann. rept. same, 1885, pp. 265.

LLOYD, E. R.

Second assistant agriculturist to the Alabama agricultural experiment station. Has had M. S. conferred upon him by the Alabama agricultural and mechanical college. Address: Auburn, Ala.

LUPTON, NATHANIEL THOMAS.

Born Dec. 19, 1830, in Frederick county, Virginia. Graduated at Dickenson college in 1849. Studied two winters in Heidelberg, Germany, under Bunsen. Was professor of chemistry and geology in Randolph Macon college, 1857-58, and the same in the Southern university, Greensboro, Ala., 1858-71. In 1871 elected president university of Alabama, with chair of chemistry, and in 1874 called to the professorship of chemistry in Vanderbilt university, where he also acted as dean of the faculty of pharmacy. In 1885 appointed Alabama state chemist, and professor of chemistry in the Alabama agricultural and mechanical college, which position he still holds. Received degree of M. D. from Vanderbilt university, and LL. D. from university of Alabama in 1875. Is a member of several scientific societies. Vice-president American chemical society in 1880. Chairman section of chemistry, American association for the advancement of science in 1877, and vice-president of this association in 1885. Address: Auburn, Ala.

PUBLICATIONS.

Has made numerous contributions to technical literature. Also is author of "The elementary principles of scientific agriculture." D. Appleton & Co., New York, 1880.

MAYNARD, SAMUEL TAYLOR.

Born Dec. 6, 1845, at Hardwick, Mass. Graduated at the Northboro, Mass., high school, and from the Mass. agric. college in 1872, receiving degree of B. S. Post-graduate student in 1872-73. Since 1879 professor of botany and horticulture at the Mass. agric. college, and since 1888 horticulturist to the Hatch agric. exp. station of same college. Address: Amherst, Mass.

PUBLICATIONS.

Reports of experiments with numerous varieties of potatoes. 1875.

Grasses and forage plants on station grounds. 1883.

Observations on insects injurious to apples. 1884.

Notes upon insects injurious to farm and garden crops. 1884.

Effects of girdling grape vines. 1884.

Vitality of seeds of weeds. 1884.

Vitality of seeds as affected by age. 1884.

Destruction of peach buds by cold. 1884.

The cultivation of the peach. 1884.

Utilization of waste lands of New England by the cultivation of fruit and forest trees. 1885.

Practical fruit grower. 1886.

Fruit culture in Massachusetts. 1887.

Experiments with new varieties of fruits. 1887.

MCBRYDE, J. M.

Born in 1841 at Abbeville, South Carolina. Educated at the South Carolina college and university of Virginia. Engaged in farming in Virginia for some years. Member of Miller trustees of the agricultural department of university of Virginia. President of Belmont farmer's club of Albemarle Co., Va. Professor of agriculture and botany at university of Tennessee, 1879-1882. Same chair in South Carolina college in 1882. In 1883 elected president South Carolina college. In 1888, president university of South Carolina, and director of agricultural experiment station of that institution. Is Ph. D. of university of Tennessee, and LL. D. of Southwestern Presbyterian university. Address: Columbia, S. C.

MCDOWELL, RANSOM H.

Graduated Mich. agr. college in 1874 with degree of B. S. Assistant foreman of farm of same college four years. Foreman and supt. Purdue university farm and experiments one year. Supt. farm Michigan state reform school six years. Now assistant agriculturist, Colorado agricultural experiment station. Address: Fort Collins, Col.

MCEACHRAN, WILLIAM.

Graduate of both medical and veterinary schools of McGill university, Montreal, Canada, having degrees of M. D. and V. S. Was dept. government inspector in Manitoba and northwestern Canadian provinces for two years. Now veterinarian to Colorado agricultural college and experiment station. Address : Fort Collins, Col.

MCINTOSH, DONALD.

Born Jan. 28, 1840, in Perth, Scotland. Educated in grammar schools of Canada. Studied medicine. Graduated Ontario veterinary college, 1869, with degree of V. S. Practiced veterinary surgery at Kingston, Ontario, 1869-82; in New York city 1882-85. Prof. of veterinary science at university of Illinois, 1885 to date. Veterinarian to agr. exp. station, univ. of Ill., 1888 to date. Address : Champaign, Ill.

MCKAY, J. F.

Born March 29, 1866, at Owenboro, Kentucky. Graduated from Miss. agricultural and mechanical college in 1888 with degree of B. S. Now assistant in horticulture at Texas agricultural experiment station. Address : College Station, Texas.

MELL, P. H.

Entered university of Georgia in 1867, pursuing a seven years' course of study, receiving the following degrees; A. B., C. E., M. E., Ph. D. Georgia state chemist from 1874-77. Professor natural history and geology in Alabama agricultural and mechanical college, 1878 to date. Director Alabama weather service from 1884 to date, and devised the present system of flags used by the U. S. weather bureau, for signalling the condition of the weather. In 1888 appointed botanist and meteorologist to the Alabama agricultural experiment station. Member American institute of mining engineers. Address : Auburn, Ala.

MENKE, A. E.

Born in 1858. Educated at Owen's college, Manchester, England: King's college, London, England: Sorbonne, Paris, and Harvard university. Received D. Sc. in 1880. From 1883-87, professor of agricultural and organic chemistry, Kentucky state agricultural and mechanical college. Now professor of chemistry to Arkansas industrial university, and director Arkansas agricultural experiment station. Address: Fayetteville, Ark.

PUBLICATIONS.

Notes on manganese dioxide.
 Some points in chemical dynamics.
 Salts of nitrous oxide, cucumin and tumerol.
 Synthesis of borneol.
 Alkaloids of *Veratrum viridæ* and *Aconitum rapellus*.
 On the composition of potatoes.
 Action of tobacco on the soil, etc., etc.

MERRILL, L. H.

A native of Maine. Graduated from the Maine state college in 1883 with degree of M. S. For two years an assistant in the department of lithology and physical geology, at the United States national museum, Washington, D. C. Since March, 1886, has been connected with the Maine experiment station. Address: Orono, Me.

MILES, MANLY.

Born July 20, 1826, at Homer, Cortland county, New York. Moved to Flint, Mich., in 1837, and followed farming till 1846, teaching school in winter from 1842-46. Common and high school education, supplemented by home studies under direction of Rev. J. G. Atterbury of Flint. Studied medicine and received degree of M. D. from Rush medical college, Chicago, Ill., in 1850. Practiced medicine till 1859, in meantime studying zoölogy and working with the microscope. Became assistant state geologist to Michigan, in charge of zoölogical department, 1859-60. Prof. of zoölogy and animal physiology, Michigan agricultural college, 1860-65. Prof. of physiology

and practical agriculture, same college, 1865-69. Prof. of practical agriculture, in same, 1869-75. Superintendent college farm, of same, 1864-75. Prof. of agriculture, Illinois industrial university, 1875-76. City engineer, Lansing, Mich., 1878-79. In charge of farming, landscape gardening and experiments at Houghton farm, Mountainville, New York, 1879-82. In charge of field and feeding experiments, Mass. exp. station, 1883. Prof. of agriculture, Mass. agric. college, 1883-86. Since that period engaged in biological investigations relating to agriculture in his private laboratory. Address : Lansing, Mich.

PUBLICATIONS.

Has contributed to numerous agricultural papers in the United States and Canada.

Report on zoölogy of Mich. *Geological survey of Mich.*, 1860.

Experiments in top-dressing grass lands.	Rep. Mich. board of agr., 1865.
" " " " " "	" " " " " 1866
" with young pigs fed with milk,	" " " " " "
" in sheep feeding,	" " " " " 1867
" " pig feeding,	" " " " " 1868
" on the application of manures,	" " " " " "
" with root crops (com'cl manures)	" " " " " "
" " Indian corn (hills and drills),	" " " " " "
" on natural variations of soils,	" " " " " "
" in pig feeding,	" " " " " 1869
" with spec'l manures (oats in rotation)	" " " " " "
" in the appl'n of manures (turnips),	" " " " " "
" with Indian corn (rotation),	" " " " " "
" " special manures,	" " " " " "
" " new varieties of grain,	" " " " " "
" " pig feeding,	" " " " " 1870
" in appl'n of manures (oats in rotation)	" " " " " "
" with spec'l manures (wheat in rota.),	" " " " " "
" " oats in rotation,	" " " " " "
" " spec'l manures (oats in rotation)	" " " " " "
Whiffletrees and draught,	" " " " " 1872
Close breeding,	" " " " " "
Experiments in pig feeding,	" " " " " 1873
Summary of results in pig feeding,	" " " " " "
Experiments with manures (grass in rotation),	" " " " " "
" special " " " "	" " " " " "
" " " (wheat " " 1871),	" " " " " "
Improvements in tile laying,	" " " " " "

Experiments with ensilage, 1875, *Country gentleman*, Oct. 5, '76, pp 627-8.

Stock breeding, D. Appleton & Co., N. Y., 1878.

Experiments with Indian corn, Mountainville, N. Y., 1882.

Scientific farming at Rothamsted, *Field exp. Pop. sc. mon.*, Nov., '82.

Scientific farming at Rothamsted, Feeding exp. *Pop. sc. mon.*, Jan., '83.

Experiments with Indian corn. *1st. rep. state agr. exp. station, Mass.*, 1883.

Experiments with ensilage. *1st. rep. state agr. exp. station, Mass.*, 1883.

Experiments in pig feeding. *1st. rep. state agr. exp. station, Mass.*, 1883.

Ensilage and fermentation. *Popular science monthly*, June, 1884.

Unconscious bias in walking. *Nature*, July, 1885.

Notes on microbes of abortion. (*Letter to chairman bd. Mass. cattle com.*, 1883).

Life on the farm. *16th annual rep. Mich. hort. soc.* 1886.

Light land farming. *Rep. Mich. bd. of agr.* 1887.

Microbes of nitrification. *Agricultural Science*, May, 1887.

Feeding for fat and lean. " " March, 1888.

Nutritive ratios. " " April, "

Feeding for fat and lean. " " July, "

Lines of progress in agriculture. *Pop. sci. monthly*, July, 1888.

Economy of ground feed. *Handbook for farmers and feeders*, Springfield, Ohio.

MINOTT, CHARLES W.

Born April 1, 1859, at Westminster, Mass. Graduated Mass. agr. college, 1883, with degree of B. S. From 1883-88, engaged in practical fruit growing and gardening. In March, 1888, elected horticulturist to Vermont agricultural experiment station. Address: Burlington, Vt.

MORROW, GEORGE E.

Born in 1840. in Ohio. Educated in home public school and neighboring academy. Graduated at university of Michigan law school in 1866 with degree of LL. B. Given an honorary M. A. from university of Wisconsin. Agricultural editor *Western rural* and *Western farmer*, 1866-75. Professor of agriculture in Iowa agricultural college in 1876; same chair in university of Illinois from 1877 to date. Agriculturist to experiment station, university of Illinois, 1888. Address: Champaign, Ill.

PUBLICATIONS.

Numerous articles in agricultural papers, or reports, addresses or papers for various agricultural, live stock and dairy associations.

MORSE, F. W.

Born Dec. 6, 1865, at Berlin, Mass. Educated in common schools home, and at Northboro high school, from which he graduated in 1882. Graduated from Worcester polytechnic institute, Worcester, Mass., 1887, with degree of B. S. Assistant chemist to Mass. state agricultural experiment station, August, 1887-88. Since 1888, assistant chemist to the New Hampshire agricultural experiment station. Address: Hanover, N. H.

MORSE, FRED WELLINGTON.

Born at Decorah, Iowa, April 9, 1855. Graduated from the university of California, 1878, with degree of Ph. B. From 1878-80 assistant in agricultural laboratory of university of California; 1880-82, assistant in viticultural laboratory of the university of California; 1882-88, assistant in the agricultural laboratory of the university of California. In the summer has been engaged in the following special work: 1880, studied phylloxera under the state viticultural and university of California commission; 1881-82, studied phylloxera under state viticultural commission; 1883, studied resistant vines; 1885, gathered viticultural statistics under the state viticultural commission; 1886, investigated vine diseases at university of California; 1887, investigated gas insecticide in Los Angeles county.

PUBLICATIONS.

The winged phylloxera in California. *The overland monthly*, March, 1883.

Spread of the phylloxera by grape boxes. *Cultivator's guide*, April 10, 1883.

Decay of grape roots. *Ibid.*, June 12, 1883.

Replanting phylloxerated vineyards. *Ibid.*, June 24, '83.

Report on the occurrence of phylloxera in California. Agricultural department, 1880.

Report on work done in viticultural laboratory, etc. Agricultural department. 1882, p. 129.

Bulletin No. 19. Agricultural department, October 1884.

Report to viticultural commission on Bauer's mercury remedy, June 19, 1885.

Observation on the life history and habits of the phylloxera in California. Agricultural department, 1886.

Report upon experiments with mercury vapor as a remedy against the phylloxera. Agricultural department, 1886.

Report upon the examination of the phenomena and causes of coulure of the vine in San Diego county. College of agriculture, 1886.

Report of comparative observations on coulure on different grape varieties. College of agriculture, 1886.

Report of an examination into the phenomena and causes of a supposed vine disease in Los Angeles county. College of agriculture, 1886.

The uses of gases against scale insects. Bulletin 71, college of agriculture.

The use of hydrocyanic acid against scale insects. Bulletin 73, college of agriculture.

Address : Berkeley, California.

MUNN, R. L.

Graduated at Texas agricultural and mechanical college, with degree of B. S. Assistant in experimental agriculture at Arkansas agricultural experiment sub-station. Address : Jonesboro, Arkansas.

MYERS, J. W.

Born May 29, 1853, in West Virginia. Educated in the State normal school of West Virginia, at West Liberty. Was student in classical course at Bethany college, West Va., and took post-graduate course, in chemistry. Studied at Tufts college, under Prof. Dolbear, in physics, and at Harvard university, in geology under Prof. Shaler. Was three and one-half years in Germany studying chemistry at universities of Göttingen, Breslau and Berlin. Was tutor in chemistry at Bethany college ; and taught chemistry and physics in Butler university, Kentucky university and in the Mississippi agricultural and mechanical college. Was state chemist of Mississippi for six years. In 1888 appointed director of the West Virginia experiment station, at Morgantown. Address : Morgantown, W. Va.

NEWMAN, CLIFFORD LEWIS.

Born July 25, 1864, at Columbus, Georgia. Attended grammar schools at Sparta, Ga., and Gordonsville, Virginia, and public schools of Atlanta, Ga., from 1877-81. Farmed two years. Graduated at Alabama agricultural and mechanical college, in 1886, with degree of B. S. First assistant at same institution in 1886, at the experiment station. Assistant in agriculture and natural history in university of Tennessee, 1887-88. Assistant in field and feeding experiment at univ. of Tenn. agricultural experiment station, 1888 to date. Address : Knoxville, Tenn.

NEWMAN, J. S.

Born in 1836 at Orange county, Virginia. Educated at the university of Virginia. Taught school and farmed 15 years in Virginia and Georgia. Editing clerk in the Georgia department of agriculture from 1875-83. From 1883 to date Prof. of agriculture in the Alabama agricultural and mechanical college, and director of the agricultural experiment stations at Auburn and Uniontown, Ala. Six years editor of *Southern enterprise*. Three years president Alabama state agricultural society. Vice-president American pomological society, Special statistical agent U. S. department of agriculture. Agricultural editor *Montgomery (Ala.) advertiser*. Address : Auburn, Ala.

PUBLICATIONS.

Farmers' scientific manual, and manuals on cattle, sheep, swine and poultry, issued from the Georgia agricultural department.

NILES, U. B.

Graduate veterinary department Iowa state agricultural college. After graduation took post-graduate course, served as house surgeon ; and gave instruction in veterinary science in the college. Served also as assistant state veterinarian. Now occupies chair of veterinary medicine at university of South Carolina, and is veterin-

arian to South Carolina agricultural experiment station.
Address : Columbia, S. C.

NOURSE, DAVID OLIVER.

Born August 19, 1861, at Bolton, Massachusetts. Graduated at Massachusetts agricultural college, 1883, with degree of B. S. Assistant at Mass. experiment station, Amherst, 1883-84. Superintendent Connecticut Valley orchard company, Berlin, Conn., 1884-85. Engaged in farming at Bolton, Mass., 1885-86. Foreman Mass. agric. college farm, 1886. Now agriculturist to Virginia agricultural experiment station, at Blacksburg, Virginia: Address : Blacksburg, Virginia.

ORCUTT, I. H.

Born June 7, 1847, in Oneida county, New York. Educated in the common schools till 1866, when entered Groveland seminary at Wasioja, Minn. Began studying medicine in 1872, and graduated from Chicago medical college, March 15, 1876, with degree of M. D. Took two years science course at university of Pennsylvania, graduating in 1880 with degree of Ph. D. In August, 1885, was elected to the chair of natural sciences at the Dakota agricultural college at Brookings, and in February, 1888, was made entomologist to the agricultural experiment station of that institution. Address : Brookings, Dakota.

OSBORN, HERBERT.

Born March 19, 1856, at Lafayette, Wisconsin. Moved to Fairfax, Iowa, in 1863. Attended home schools, and for a short time Iowa college, at Grinnell. Graduated from Iowa agricultural college in 1879, with degree of B. S., later receiving M. S. from same. Studied at Harvard university, under Dr. Hagen, in the museum of comparative zoölogy. Assistant in zoölogy and entomology, from 1879-83 in Iowa agricultural college, and at present professor of zoölogy and entomology at the same institution. Address : Ames, Iowa.

PUBLICATIONS.

Annual reports or papers in the transactions of the Iowa horticultural society, 1878-87. Articles in *Canadian entomologist*, *Entomologica Americana*, *American naturalist*, publications of the U. S. department of agriculture, etc.

PAMMEL, L. H.

Born April 19, 1862, at La Crosse, Wisconsin. Graduated from university of Wisconsin, 1885, with degree B. Agr. Assistant to Dr. W. G. Farlow, Harvard university, 1886. At Shaw school of botany, 1887-88. Investigating root rot of cotton for Texas agricultural experiment station. Member St. Louis academy of sciences. Prof. of botany in Iowa agricultural college, and special worker in botany for the Iowa agricultural experiment station. Address: Ames, Iowa.

PAQUIN, PAUL.

Born June, 1860, in Argenteuil county, Canada, of French-Canadian parents. First English education at a local school; later had English and French education at Bourget college, Rigaud. Studied medicine at *college de medicine et chirurgie de Montreal*, and at the Montreal veterinary college. Received degree of D. V. S. in March, 1881. Appointed state veterinarian of Missouri in 1885. Studied contagious diseases of man and beast, bacteriology, etc., at the Alfort (France) veterinary school; at Dr. Latteux's pathological laboratory, at Dr. Cornil's bacteriological laboratory (Paris medical school), and at the conferences of Dr. Perdrix, in Pasteur's institute, Paris. Received the degree of M. D. from the Missouri state university and Missouri medical college. Is now state veterinarian of Missouri; professor of veterinary science at the agricultural college of the university of Missouri; professor of comparative medicine in the medical department of the university of Missouri; director of vaccine and experimental laboratory of the university, and veterinarian of the agricultural experiment station of the university. Address: Columbia, Missouri.

PUBLICATIONS.

Numerous essays on animal diseases.

Bulletins No. 15, 16, 24, 31 and 33 of the Missouri agricultural college. Winner of \$100 prize in *American veterinary review*. Author of articles on heredity and breeding in *Kansas city live-stock indicator*, during 1887.

PATRICK, G. E.

Born in 1851, at Hopedale, Mass. Graduated at Cornell university, with degrees of B. S. and M. S. from same. Instructor in Cornell one year, professor of chemistry in university of Kansas nine years, chemist to Iowa agr. experiment station, 1888 to date. Address : Ames, Iowa.

PUBLICATIONS.

Has published numerous papers, mostly in *Proceedings of Kansas academy of sciences*.

PATTERSON, HARRY J.

Born Dec. 17, 1866, at Yellow Springs, Pennsylvania. Studied at the Penn. state college preparatory school ; and graduated from Penn. state college in 1886, with degree of B. S. From 1886-88, assistant chemist to Penn. state college agricultural experiment station, and since 1888, chemist to the Maryland agricultural experiment station. Address : Agricultural college, Md.

PEABODY, SELIM H.

Born Aug. 20, 1829, at Rockingham, Vt. Educated in public schools, academies and university of Vermont, graduating at latter in 1852. Has degrees of A. B., A. M., Ph. D. and LL. D., the latter from Iowa university. Was professor of mathematics in Fairfax seminary, Vt., 1853-54. Prof. mathematics and civil engineering, Polytechnic college, Philadelphia, Pa., 1854-57. Prof. natural sciences Chicago high school, 1865-71 and 1874-78. Prof. physics and engineering Mass. agric. college, 1871-74. Prof. mechanical engineering, university of Illinois, 1878-80. Regent (President) university of Illinois, 1880 to date. President board directors agricultural experiment station, 1888 to date. Address : Champaign, Ill.

PUBLICATIONS.

Editor-in-chief American edition Chambers' encyclopædia, 1880.

Author various books on natural history, mathematical text books, and scientific treatises.

PENNY, CHARLES L.

Born in Pennsylvania in 1858, at Lewisburg. Educated at Bucknell university, Lewisburg, Pa., at Heidelberg, Germany, and at Harvard college. Has degree of A. M. Held chair in natural science at state normal school at Shippensburg, Penn., for six years. Now holds same chair in Delaware college, and is assistant chemist to the Delaware experiment station. Address: Newark, Del.

PERKINS, G. H.

Graduated at Yale college, and is Ph. D. of the same. Worked under geologist Marsh for a while. Howard professor of natural history of the university of Vermont, for nearly 20 years. Is also entomologist to Vermont agricultural experiment station. Address: Burlington, Vermont.

PETER, A. M.

Born May 25, 1857, at Lexington, Kentucky. Graduated at Kentucky agricultural and mechanical college, 1880, with degree of B. S. Given M. S. degree in 1882. Adjunct professor of chemistry and natural history at same institution, 1881. Instructor in chemistry at same college, and assistant chemist to Kentucky geological survey, 1885 to date. Assistant chemist Kentucky agricultural experiment station, 1885 to date. Address: Lexington, Ky.

PHELPS, CHARLES S.

Born December 5, 1861, at Florence, Mass. Early education in home public schools. Graduated at the Mass. agricultural college in 1885 with degree of B. S. Post-graduate at same college during 1885. Assistant chemist at Mass. state experiment station, 1886-87. As-

sociate manager, Vine Hill and Ridge farms, West Hartford, Conn., 1887-88. Vice-director Storrs' school agricultural experiment station, Storrs', Connecticut, since April 1, 1888. Address: Storrs', Conn.

PILLSBURY, W. L.

Born Nov. 4, 1838, at Surry, N. H. Educated at Phillips academy, Andover, Mass., and Harvard university, graduating from latter in 1863 with A. B. degree. Now A. M. Professor state normal university, Normal, Ill., 1863-70. Assistant in office state supt. public instruction of Illinois, 1879-1886. Secretary agricultural experiment station, university of Illinois, 1888 to date. Address: Champaign, Ill.

PLUMB, CHARLES S.

Born April 21, 1860, at Westfield, Mass. Educated in public schools of native home till 17 years of age. Graduated in 1882 from Mass. agricultural college with degree of B. S. Assistant editor *Rural New-Yorker*, New York City from February, 1883, to June, 1884. From latter date to Oct. 1, 1887, assistant director New York agricultural experiment station at Geneva, N. Y. In August, 1887, elected professor of agriculture and natural history to the university of Tennessee and state agricultural college. In 1888 the office was changed to professor of agriculture, solely. Same year made assistant director and in charge of field and feeding experiments at the agricultural experiment station of the university of Tennessee and state agricultural and mechanical college. Address: Knoxville, Tenn.

PUBLICATIONS.

Is publisher and editor of *Agricultural Science*, established by him in 1887.

Contributed to New York agr. exp. station reports for 1884, 1885, 1886 and 1887, the work relating especially to the cereals and grasses.

The fallacies of plat experimentation. *Agricultural science*, Jan., 1888, pp. 4-13.

Concerning the growth of maize. *Ibid.*, Jan., 1889, pp. 5.

Dehorning cattle. Bull. i, Tenn. agric. exp. station, 1888.

Germinating seed corn. Bull. ii, Ibid.

Is editor and publisher of this directory. Has contributed to various agricultural and other periodicals, viz.: *Country gentleman*, *Rural New-Yorker*, *Prairie farmer*, *American agriculturist*, *Our country home*, *Southern cultivator*, *Tennessee farmer*, *New England farmer*, *Southern live-stock journal*, *National live-stock journal*, *New England homestead*, *New York tribune (weekly)*, *Philadelphia weekly press*, etc.

PORTER, EDWARD D.

Born August 12, 1829, at Tinmouth, Rutland Co., Vermont. Primary education in the district schools of Vermont and the grammar schools of Philadelphia, Pa. Graduated July 3, 1851, at university of Pennsylvania with degree of B. A. Appointed professor of natural philosophy and civil engineering in Delaware college, Newark, Del., May 30, 1851. On June 30, 1855, elected professor of mathematics and astronomy in the same college, which position he resigned July 1, 1859. Appointed principal of New London academy, New London, Chester Co., Penn., August 12, 1859, and resigned April 1, 1861. Elected principal of Newark academy, Newark, Delaware, April 1, 1861, and acted as same 13 years. In 1867 reorganized Delaware college as an agricultural college, and was appointed vice-president and professor of agriculture. In 1873 resigned principalship of Newark academy, and devoted himself to the chair of agriculture and natural sciences at Delaware college, and the management of the experimental farm. In January, 1881, resigned his connection with Delaware college, after nearly 30 years constant connection with that institution, to accept the chair of theoretical and practical agriculture in the university of Minnesota. When the legislature of Minnesota authorized the establishment of an agricultural experiment station, under the control of the state university, he was made director, which position he now holds. July, 1, 1854, received degree M. A. from university of Pennsylvania, and that of Ph. D. from Delaware college in 1883. Address: St. Anthony's Park, Minnesota.

POUMÉROULIE, CHARLES.

Born in 1863 at Chabanais (Dept. de la Charente), France. Attended public schools of native town. Studied seven years at the college of agriculture at St. Antoine (Charente inferieure), in the theory and practice of agriculture and horticulture graduating in 1882, receiving diploma in the first degree in these studies under director Theophile Dumas. After graduation passed two years with the Marquis de Dampierre, president of the agricultural society of France, to experiment with grape disease. From 1884-85 engaged in various horticultural establishments, for getting additional information in floriculture, vine culture and nursery work. Came to America in March, 1886, and to the Minnesota agricultural experiment station about April 1, 1886. Now assistant in horticulture at same station. Address: St. Anthony's Park, Minn.

PRESCOT, A. T.

Graduate of Louisiana state university, in which he is now a professor. Biologist to the Louisiana state agricultural experiment station. Has degree of A. M. Address: Baton Rouge, La.

PRESTON, WILLIAM BALLARD.

Born in 1858. Native of Virginia. Educated at Hampden Sidney college, Virginia, and the Virginia military institute. Formerly professor of physics, etc., at Virginia agricultural and mechanical college; professor of agriculture and director of college farm, at same institution. May 23, 1888, elected director of agricultural experiment station at the Virginia agricultural and mechanical college. Address: Blacksburg, Virginia.

RICHARDSON, CLIFFORD.

Born March 6, 1856, at Worcester, Mass. Fitted for Harvard university at Worcester high school, and graduated from former in 1877, with degree of B. A. For one year worked with Prof. J. P. Cooke on his researches into the atomic weight of antimony. From 1877-78, at uni-

versity of Bonn, Germany. From July to Nov., 1878, on the U. S. geological and geographical survey, under Dr. F. V. Hayden, in western Wyoming and the Yellowstone park, acting as assistant photographer, and collector of botanical specimens. In November, 1878, appointed assistant chemist U. S. department of agriculture. Has made a special study of the chemical composition of American grasses, and fodder crops and cereals, reporting results of same in U. S. department of agriculture reports and bulletins. Appointed second assistant chemist of department in 1880, and first assistant chemist in 1882. From April-July, 1883, acting chemist. Since June, 1887, chemist to the District of Columbia. For four years past, secretary association of official agricultural chemists. Is a F. C. S., and member of the society of chemical industry, German chemical society, the American association for the advancement of science, etc., etc. Address: Washington, D. C.

PUBLICATIONS.

The chemical composition of American wheat and corn, pp. 69. Bull. No. 1, chem. div. U. S. dept. agr., 1883.

The chemical composition, etc. Second report, pp. 98. *Ibid.*

Third report on the chemical composition and physical properties of American cereals, wheat, oats, barley and rye. Bull. No. 9, pp. 82, 1886. *Ibid.*

Food and food adulterants. Bulletin No. 13, part 2, pp. 130, pl. 16, 1887. *Ibid.*

Food and food adulterants: Spices and condiments. *Ibid.*, 1888.

Methods of analysis of commercial fertilizers. Proc. 3d ann. conv. off. agr. chem., Aug. 26-27. '86, pp. 59. Bull. 12. *Ibid.*

Methods of analysis of commercial fertilizers, feeding stuffs and dairy products, adopted at the 4th ann. conv. ass. off. agr. chem., Aug. 16-18, 1887, pp. 80. Bull. 16, *Ibid.*

The agricultural grasses of the United States, by Dr. Geo. Vasey; also the chemical composition of American grasses by Clifford Richardson, 1884.

RICHMAN, E. S.

Born in 1861. Graduated at Iowa agricultural college in 1886 with degree of B. S. Assistant in farm experi-

ments in 1887. Now horticulturist to the Arkansas agricultural experiment station. Address: Fayetteville, Ark.

RILEY, CHARLES V.

Born Sept. 18, 1843, in London, England. Boyhood spent at Walton, on the Thames. Subsequently attended private schools at Chelsea and Bayswater, till 1854, when he went to France and entered the college of St. Paul at Dieppe, where he remained three years. The next three years were spent in a private school at Bonn, Prussia. In 1860 came to America and settled on a farm in Illinois, in Kankakee county, where he remained till he went to Chicago to become reporter on the *Evening journal*, and finally became editorially connected with the *Prairie farmer*. Served in 134th Illinois volunteers from May, 1864, till close of the war. In the spring of 1868 became state entomologist to Missouri, holding this place till 1877, when he took charge of the United States commission for investigating the Rocky Mountain locust. Made United States entomologist in spring of 1878, which place he resigned in 1879, and during this and the next year was engaged on the entomological commission. Was re-appointed United States entomologist upon the accession of Dr. Loring to the commissionership of agriculture, which position he has since held. Is curator of insects in the Smithsonian institution. Is corresponding member of London, French, Berlin, Swiss, Belgian and American entomological societies. For many years recording secretary, and for two years president St. Louis academy of science. Is a fellow of the American philosophical society; American pomological society; American association for the advancement of science; Association for the promotion of agricultural science, and of the philosophical and anthropological societies of Washington, D. C. Has been lecturer on entomology to Cornell university, the Kansas state agricultural college, Missouri state university and Washington university, St. Louis. In 1872 given honorary A. M. by Kansas agricultural col-

lege, and Ph. D. by Missouri state university in 1873.
Address : Washington, D. C.

PUBLICATIONS.

In 1868 established the *American entomologist*, which completed two volumes. Has contributed voluminously to agricultural journals, especially *Colman's rural world*, *Rural New-Yorker*, *New York tribune*, *St. Louis Journal of agriculture*, *Garden* (London), *Nature* (London), *Gardener's monthly*, *American agriculturist*, *Popular science monthly*, *American naturalist*, etc.

Nine reports on insects of Missouri.

Potato pests. Orange Judd company.

Locust plague in the United States, 240 pp.

Economic entomology in Campbell's atlas of Missouri.

Contributed to Appleton's *American cyclopædia*, Johnson's *universal cyclopædia*, and the American edition of *Cyclopædia Britannica*.

Reports chief of entomological division of United States department of agriculture, excepting years 1880-81.

ROBERTS, ISAAC PHILLIPS.

Born July 24, 1833, at East Varick, Seneca county, New York. Educated in district schools up to the age of 16. Three years in Seneca Falls (N. Y.) academy. Two winters of private instruction under a Yale graduate. Given degree of M. Ag. by Iowa agricultural college. Secretary board trustees same institution 1870-74, and occupied chair of agriculture there 1871-74. Member society for the promotion of agricultural science. Fellow national science association. Professor agriculture at Cornell university, 1874 to date. Appointed director Cornell university agricultural experiment station, 1888, and dean college of agriculture of Cornell in June, 1888. Address : Ithaca, N. Y.

PUBLICATIONS.

Author of about 100 papers published in Canadian, New York, Wisconsin and Pennsylvania annual dairy reports, and in leading agricultural papers of the United States.

Agricultural education. *Cylopædia of education*.

Development of American agriculture : *Encyclopædia Britannica*.

Effect of foods on civilization. Annual report for 1887, Holstein Friesian breeders' association.

ROSS, B. B.

Graduate of the Alabama agricultural and mechanical college. Chemist to the Louisiana agricultural experiment station. Is also professor in the Louisiana state university and agricultural and mechanical college. Has degree of M. S. Address : Baton Rouge, La.

ROSS, ISAAC.

Graduate of university of Alabama. Was breeder of Jersey cattle near Opelika, Ala. Now first assistant agriculturist, and in charge of the stock and dairy at Alabama experiment station. Address : Auburn, Ala.

RUSSELL, FRANK L.

Native of Maine. Graduated at the Maine state college in 1885, with degree of B. S. Since then graduated at the New York college of veterinary surgeons, with degree of V. S. For a time a practicing veterinary surgeon at Lewiston, Maine. In March, 1888, elected veterinarian to the Maine agricultural experiment station. Is now engaged in studying bacteriology and pathology at John's Hopkins university. Address : Baltimore, Md,

SALMON, DANIEL E.

Born July 23, 1850, in Morris county, New Jersey. Graduated at Cornell university in 1872, with degree of B. V. S. Visited Europe in 1872, and took a two term course at Alfort veterinary school, France. Given D. V. S. by Cornell university in 1876, and made non-resident lecturer on veterinary science at same institution in 1877. In 1878 was appointed for two months veterinarian to the bureau for investigating swine diseases. In 1879 was appointed assistant to Dr. Law of Cornell to aid in stamping out contagious pleuro-pneumonia. This same year, under the auspices of U. S. department of agriculture began investigating animal diseases in the south. In 1883 commissioner of agriculture Loring appointed him to take charge of a veterinary division of the U. S. dept. of agriculture, and the same year congress

passed an act establishing a bureau of animal industry, to which he was appointed chief, which position he has since held. Address : Bureau animal industry, Washington, D. C.

PUBLICATIONS.

Many scientific papers in the reports of the United States department of agriculture and bureau of animal industry. Also in the proceedings of the American association for the advancement of science, the society for the promotion of agricultural science; the American public health association, and the biological society of Washington, D. C.

SAMFORD, T. D.

Graduated from Alabama agricultural and mechanical college 1887 with degree of B. S. Assistant in botany and meteorology to Alabama agricultural experiment station. Address : Auburn, Ala.

SANBORN, JEREMIAH W.

Born Feb. 4, 1847, at Gilmanton, New Hampshire. Educated at the academies of Pittsfield and Gilmanton, N. H. Given degree of B. S. by the New Hampshire agricultural college. Supt. of public schools of Gilmanton when 21 years old. At 27 years of age became member of state legislature, and chairman in same of committee on the agricultural college. In 1866 was elected superintendent of the New Hampshire agricultural college farm, In 1882, went to university of Missouri at Columbia, to become professor of agriculture and dean of the agricultural department. In 1882 elected secretary Missouri state board of agriculture. Is at present professor of agriculture in the university of Missouri, and director of the agricultural experiment station of that institution. Address : Columbia, Missouri.

PUBLICATIONS.

Numerous papers in the transactions of the New Hampshire State board of agriculture, concerning investigations on the New Hampshire agricultural college farm, up to 1882. General contributions to the agricultural press of the country. Twenty-eight bul-

letins of the university of Missouri agricultural college farm an dexperiment station. Contributed the portion on the world's progress in agriculture in Gateley's "World's progress."

SCHWEITZER, PAUL.

Born March 16, 1840, at Berlin, Germany. Educated at the gymnasium and university of Berlin. Degree of Ph. D. from university Göttingen. From 1860-62 was chemist of chemical works at Schoeningua, Brunswick, Germany. Assistant to Prof. Henry Rose of Berlin from 1862-63. Volunteer in Prussian army 1863-64. Assistant teacher, polytechnic school of the state of Pennsylvania, Philadelphia, 1865-66. Assistant school of mines, Columbia college, New York city, 1866-72. Professor of chemistry in Missouri state university from 1872 to date. In July, 1888, elected chemist to Mo. agr. exp. station. Corresponding member New York academy of science. Fellow American association for the advancement of science. Address: Columbia, Mo.

PUBLICATIONS.

On tribasic phosphoric acid, etc. *Annals of the lyceum of natural history*, N. Y., 1869.

On the quantitative separation and determination of iodine, bromine and chlorine. *Chemical news*, (American supplement) 1869.

The various methods for the determination and separation of baryta, strontia and lime, etc. *American chemist*, 1870.

On chresol and phenol and their homologues. *American chemist*, 1871.

On the action of sulphurous acids on metals. *Ibid.*

Notice of a curious boiler deposit. *Ibid.*

On the felsites of the Palisade ranges. *Ibid.*

On the employment of bromine in analytical chemistry. *Ibid.* (Translation.)

Analysis of two specimens of mica. *Catalogue Mo. state university*. 1874.

Analysis of four feldspars. *Ibid.*

Action of rain water on lead pipes. *Ibid.*

Columbia chalybeate spring. *Ibid.*

The water supply of Columbia. *Ibid.*

On the specific gravity of lead. *Ibid.*

On the true composition of coal, and on the methods of arriving at it, etc. *Ibid.* 1875.

The water supply of Columbia, Boone Co., Mo. *Ibid.*

The various methods of separating and determining barium, strontium and calcium. Proc. Amer. chem. soc., 1876.

On the cause of discrepancies in the estimation of silver in pig lead. *Ibid.*

Analysis of the gneiss of Manhattan island. *Ibid.*

Some new acid ammonium sulphates. *Ibid.*

A lecture on petroleum, its history, etc. Pamphlet, 1878.

Analysis of potable waters. Rep. chemist of board of health to town of Columbia, Mo., 1879.

Statistics on the production of wheat in the United States, etc. Rep. Board of agriculture of Missouri. 1881.

A large number of analyses of mineral waters. 1881.

SCOVELL, M. A.

Born Feb. 26, 1855, in New Jersey. Graduate of the chemical course, university of Illinois, 1875, with degree of B. S., and given degree of M. S. for post graduate work, by same. Assistant in chemistry, instructor, assistant professor and professor of agricultural chemistry at university of Illinois, 1875-82. Chemist and manager Kansas sugar company, 1882-85. Special agent U. S. department of agriculture, 1885, for the erection of diffusion batteries for extraction of sugar from sorghum and sugar cane in Kansas and Louisiana. Director Kentucky agricultural experiment station, 1885 to date. Address: Lexington, Ky.

PUBLICATIONS.

Report on the manufacture of sugar, syrup and glucose from sorghum. By H. A. Weber and M. A. Scovell. 1881.

Reports and bulletins Kentucky agricultural experiment station.

SCRIBNER, F. LAMSON.

Born April 19, 1851, at Salem, Mass. Educated in district school at Manchester, Me., and in Hebron, Kent's Hill and Waterville Classical institute. Graduated in Maine state college in 1873, with degree of B. S. Taught in district schools of Maine during college course. Lectured on botany in 1876 in Bowdoin college summer school of science, and previous to this taught botany to the school teachers and others of Bangor, Me. Assistant

in fish hatchery with commissioner C. G. Atkins, at Bucksport and Grand Lake Stream, Maine, 1874-75. An officer in Girard college from Jan. 1, 1877-May 1, 1885. Field botanist to Northern trans-continental survey, 1883. From May 1, 1885-Nov. 1, 1888, in United States department of agriculture of Washington, first as assistant botanist (one year) and then as chief of the section of vegetable pathology. From Nov. 1, 1888, to date, professor of botany and horticulture, university of Tennessee and state agricultural and mechanical college, Knoxville, and botanist and horticulturist to Tennessee agricultural experiment station. Member academy natural sciences of Philadelphia, and recording secretary botanical section same; society for the promotion of agricultural science, Buffalo academy of natural science; biological society of Washington. Corresponding member Torrey botanical club. Fellow American association for the advancement of science. Chevalier of the order of merit agricole of France. Address: Knoxville, Tenn.

PUBLICATIONS.

- Weeds of Maine. Report Maine board of agriculture for 1869.
- Ornamental and useful plants of Maine, l.c., 1874.
- List of grasses collected by Mr. C. G. Pringle in Arizona and California in summer of 1881. *Torrey bulletin*, 1882 vol. ix, 6, 7, 8, 12; x, 3.
- List of grasses from Washington Territory, l. c. vol. x, 6, 7.
- Grasses of the Yellowstone national park. *Botanical gazette*, vol. xi, 7.
- Some arctic grasses, l.c., vol. xi, 2.
- New or little known grasses. *Torrey bulletin*, vol. xv, 1.
- Notes on Andropogon. *Botanical gazette*, vol. xiii, 11.
- Observations on the genus *Cinna*, with description of a new species. Proc. acad. nat. sci., of Philadelphia, 1884, 1 pl.
- Revision of the North American Meliceæ, l. c., 1885, pp. 40-48, 1 pl.
- Agricultural grasses of central Montana. Proc. soc. pro. of agr. sci., 1883, pp. 12.
- Agricultural grasses of Arizona, l. c., 1885, pp. 5.
- Black rot, l. c., 1885, pp. 7.
- A new fungus disease of the vine: *Greeneria fuliginea*, l. c., 1887, pp. 2.

New observations on the fungus of black rot of grapes, l. c., 1888, pp. 4.

Successful treatment of black rot, l.c., 1888.

Contributions to the flora of Kansas—*Gramineae*, pl. 3, pp. 5. Proc. 17th ann. meet. Kansas acad. of sci.

Fungus diseases of plants. U. S. dept. of agr. rep., 1885, pp. 76-87, pl. 1.

Fungus diseases of the grape vine. Bull. 2, botan. div., U. S. dept. agr., pp. 123, pl. 7, 1886.

Report mycological section. U. S. dept. agr. rep., 1886, pp. 95-138, pl. 9, maps 2.

Report section vegetable pathology, U. S. dept. agr. rep., 1887, pp. 323-397, pl. 17.

Report on the experiments made in 1887 in the treatment of the downy mildew and the black rot of the grape vine, with a chapter on the apparatus for applying remedies for these diseases. Bull. 5, botanical div., section vegetable pathology, U. S. dep. agr., 1888, pp. 113, fig. 24, pl. 11.

Fungicides. Circular, section vegetable pathology. U. S. dept. agr., No. 5, pp. 10, fig. 2, 1888.

Cereals and grasses. Cyc. Brit. Amer. supp.

Botanical characters of the black rot. *Physalospora Bidwellii*, Sacc. Read before botanical club. Amer. ass. for the adv. of sci., 1888, pp. 4, pl. 1.

Black rot (*Læstadia Bidwellii*) (with P. Viala). Bull. 7, section veg. path., U. S. dept. of agr., 1888, pp. 29, pl. 1.

Fungus diseases of the vine and their remedies. Proc. N. J. state hort. soc., 12th ann. meeting, 1886, pp. 123-145, pl. 1.

Observations the past season with grape rot and mildew, , l.c., 1887 pp. 133-146.

Le traitement du black rot en Amerique, par M. P. Viala, suivi du rapport officiel par M. Lamson Scribner. *Progres agricole*, 1888, pp. 7, fig. 3.

Experiences sur le traitement du black rot et du brown rot en Amerique. *Le progrès agricole*, Sept. 30, 1888.

Has also contributed various papers on grasses and fungi for *Colman's rural world*, *Orchard and garden*, *Maine farmer*, *Home farm*, *Progrès agricole*, *Torrey bulletin*, *Botanical gazette*.

SHELTON, EDWARD MASON.

Born Aug. 7, 1846, at Huntingdonshire, England. Came to America (western New York) in 1855, and removed to Michigan in 1860. Graduated from Mich. agr. college in 1871. Studied under Dr. Manley Miles at Illinois industrial university. Superintendent of the

government experiment farm, Tokio, Japan, 1872. In 1873 joined the Greeley colony of Colorado, but returned to Mich. agr. college. Since 1874 professor of agriculture and superintendent farm, Kansas agricultural college, and since 1888 director agricultural experiment station of that college. Address: Manhattan, Kan.

PUBLICATIONS.

Has contributed largely to the agricultural press, and written reports and bulletins of the experiment work at the Kansas agr. college farm.

SHIEL, WILLIAM.

A native of Scotland. In charge of the field experiments at the Louisiana sugar experiment station. Address: Kenner, La.

SHORT, FREDERICK GARLAND.

Born 1858, in Boston, Mass. Graduated from the Boston city schools. Was two years special student in chemistry at Harvard university. Instructor in chemistry one year at Worcester free institute, Worcester, Mass. From 1884 to date first assistant chemist to Wisconsin agricultural experiment station.

SIMONDS, F. W.

Born in 1853. Graduated from Cornell university in 1875 with degree of B. S., receiving M. S. in 1876 from same, and Ph. D. from Syracuse university in 1879. Instructor in geology and paleontology at Cornell university, 1875-77. Prof. of geology, zoölogy and botany at university of North Carolina, 1877-81. Special agent for 10th census United States in 1880. Lecturer on economic geology, Cornell university, 1887. Since, professor of biology and geology to Arkansas industrial university. Special assistant to Arkansas geological survey since 1887. Biologist to Arkansas agricultural experiment station. Address: Fayetteville, Ark.

PUBLICATIONS.

On the geological survey of Ithaca, N. Y., and vicinity.

Rhododendron Catawbiensis.

Discovery of iron implements in a prehistoric mine in North Carolina.

Occurrence of mica in North Carolina.

New Alamado mines of California, etc.

SIMS, C. W.

Was graduated from South Carolina college (now university of South Carolina) in 1883 with degree of B. S. After post-graduate course of three years in this college, was given M. A. Taught in graded schools of Columbia, S. C. Is now assistant chemist to the South Carolina agricultural experiment station. Address: Columbia, S. C.

SPEER, R. P.

Born in 1828 near Pittsburg, Pennsylvania. Educated at Alleghany college, Penn. Moved to Cedar Falls, Iowa in 1853. Capt. Co. B. 31st, Iowa infantry vol., 1862-65. Owned and managed for 22 years the largest general nursery of fruit and forest trees, etc., in northern Iowa. In 1874 member lower house of Iowa legislature. President Iowa state horticultural society for two years, and director of said society 12 years. Member board of trustees Iowa agricultural college for four years. In February, 1888, elected director Iowa agricultural experiment station. Address: Ames, Iowa.

PUBLICATIONS.

Has contributed articles for many years to annual reports Iowa state horticultural society.

SPENCER, GUILFORD L.

Graduated from Purdue university in 1879 with degree of B. S. and A. C. Studied at university of Michigan, 1879-81, receiving degree of M. S. Assistant to state chemist of Indiana, 1882. Student in H. Pellet's private laboratory, Paris, France. Assistant chemist, in general analytical work, U. S. department of agriculture. Address: Washington, D. C.

PUBLICATIONS.

Bulletin 5, division of chemistry, U. S. dept. of agriculture, part II, pp. 106-136.

Bulletin 11. Ibid.

Bulletin 15. Ibid.

Papers on the manufacture of sugar and determination of phosphoric acid.

SMITH, JARED GAGE.

Born in 1886, at Scotsburgh, N. Y. Graduated in 1888, at the university of Nebraska, with degree of B. S. Assistant agriculturist, agricultural experiment station, university of Nebraska.

SMITH, LOREN P.

Born Oct. 16, 1850, at Trumansburg, New York. Educated in public schools home, and graduated at Cornell university in 1872, with degree of B. Agr., receiving M. S. degree from same in 1873. Employed two years at the Alexander institute, White Plains, N. Y., and one winter on the Vermont state board of agriculture, by the university of Vermont. Address: Ames, Iowa.

PUBLICATIONS.

Confined to newspaper articles.

SMITH, THEOBALD.

Born in 1859, at Albany, New York. Graduated at Albany high school in 1876; at Cornell university in 1881 with degree of Ph. B., and at Albany medical college in 1883 with degree of M. D. Since early in 1884 has had charge of the laboratory of the bureau of animal industry of the U. S. dept. of agriculture. Non-resident lecturer on pathogenic bacteria and their relation to hygiene at Cornell university, 1886 and 1887. Lecturer on bacteriology at the Columbian university medical college, Washington, D. C. Address: Bureau animal industry, Washington, D. C.

PUBLICATIONS.

During past four years has published 10-15 minor articles on bacteriology in New York and Philadelphia medical journals. Some of these have been reprinted in the *American microscopical journal*.

STOCKBRIDGE, HORACE EDWARD.

Born May, 19, 1857, at North Hadley, Mass. Studied in public schools of Hadley and Amherst, and at Power's institute, Bernardston, Mass. Graduated from Mass. agricultural college in 1878 with degree of B. S., and receiving same from Boston university. Post-graduate in chemistry at Mass. agr. college, 1878-80, being assistant in sorghum sugar experiments at Amherst in 1878. Special chemist to United States department of agriculture, Washington in 1888. Student in chemistry January to September, 1881, at Mass. agr. college, and from September, '81, to January, '82, instructor in chemistry at same institution. From April, 1882, to August, 1884, studied chemistry, agriculture and the natural sciences at Göttingen, Germany, receiving Ph. D. degree in August, 1884. Associate professor of chemistry, Mass. agr. college, 1884-85. From June, 1885-88, professor of chemistry and geology in the Imperial college of agriculture, Sapporo, Japan, and in 1887 appointed chief chemist to the government for the department of the Hokkaido. Now director Purdue university agricultural experiment station. Address: Lafayette, Indiana.

PUBLICATIONS.

Six prize essays from the Penn. state agricultural society, 1879-86.

Ueber die Analytischen Bestimmungen der Zuckers der Kühle nebst der Anwendung von Neuren Verfahren. 1884.

Comparative experiments with manures in solid and liquid forms, 1886.

Occurrence of muscarine as a product of putrefaction: Fatal poisoning through the consumption of this alkaloid as a ptomaine, 1887.

Report on a case of criminal morphine poisoning, 1887.

Report of the chemist to the government for the Hokkaido, including experiments conducted, 1888.

Rocks and soils : their origin, composition, and characteristics, chemical, geological and agricultural. John Wiley and Sons. 1888.

STONE, WINTHROP ELLSWORTH.

Born June 12, 1862, in Chesterfield, New Hampshire. Attended the public schools of that town, and Amherst, Mass. until 1878. Graduated in 1882 at the Mass. agricultural college with degree of B. S. Assistant and in charge for a time of experimental work at Houghton farm experiment station, from 1882 to 1884. From 1884-86 assistant to Dr. C. A. Goessmann at Mass. agricultural experiment station. Studied two years at the university of Göttingen, Germany, in 1888 receiving degree of Ph. D. in chemistry and botany. Since Sept. 1, 1888, chemist to the Tennessee agricultural experiment station at Knoxville. Address : Knoxville, Tenn.

PUBLICATIONS.

Published short papers in connection with the work at Houghton farm in reports of the same, in reports of New York state agricultural society, and articles in various agricultural periodicals.

Ueber die Gährung der Galactose. *Ber.d.Deutsche Chem. Gesellschaft.*, xxi, 1573.

Furfurol bildung als Reaction auf Arabinose. *Ibid.*, xxi, 2148.

Ueber Arabinose, Galactose und ähnliche Körper. Pamphlet.

A reaction for arabinose and its occurrence in cereals. *Agricultural science*, Dec., 1888.

STUBBS, WILLIAM C.

Born in Gloucester county, Virginia. Educated at William and Mary and Randolph Macon colleges, and the university of Virginia, graduating at the latter in 1868. Taught in east Alabama college, and the Alabama state agricultural and mechanical college till 1885. Was also Alabama state chemist till 1885. From 1885 to date professor of agriculture in the Louisiana state university, and state agricultural and mechanical college, director of the agricultural experiment stations, and state chemist. Has degree of A. M. and Ph. D. Address : Baton Rouge, La.

STURTEVANT, E. LEWIS.

Born Jan. 23, 1842, at Boston, Mass. Graduated at Bowdoin college, degree of A. B. Enlisted Sept. 10, 1862. Jan. 10, 1860, Capt. Co. G. 24th Maine volunteers. Editor *Scientific farmer*, Boston, Mass., part of the time in conjunction with E. H. Libby, from February, 1876, to October, 1879. Director New York agricultural experiment station, Geneva, New York, January, 1882, to December, 1887. Address : South Framingham, Mass.

PUBLICATIONS.

Frequent contributor to agricultural press, and lecturer on agricultural subjects.

SUMMERS, HENRY E.

Born August 18, 1863, in Rochester, New York. Graduated from Rochester free academy in 1882, and from Cornell university in 1886 with degree of B. S. From 1886-87, fellow in comparative anatomy at Cornell and during 1887-88 in comparative anatomy and entomology at same. Since 1888 associate professor of zoölogy at the university of Tennessee, and entomologist to the Tennessee agricultural experiment station. Address : Knoxville, Tenn.

SWEETSER, WILLIAM S.

Born Dec. 24, 1865, at Worcester, Mass., where received early education. Graduated from Worcester high school in 1885, and Worcester polytechnic institute in 1888, in chemical course, receiving degree of B. S. Now second assistant chemist at Pennsylvania state college agr. exp. station. Address : State College, Penn.

TAFT, LEVI R.

Born Aug. 22, 1859, at Menden, Mass. Studied at Menden high school, 1874-78. Graduated from Mass. agricultural college in 1882, with degree of B. S. Assistant in botanical department, Mass. agr. college, 1882-85, and assistant professor of horticulture and bursar 1883-85.

Professor of horticulture and assistant professor of biology, university of Missouri, 1885-88. Since '88 professor of horticulture in the Michigan agricultural college, and horticulturist to the agricultural experiment station of the same. Address : Agricultural College, Mich.

PUBLICATIONS.

Has contributed to the agricultural press.

THORNE, CHARLES E.

Born Oct. 4, 1846, in Green county, Ohio. Educated in country district and private schools, supplemented with a few terms in the Michigan agricultural college, and in Antioch college. Farm superintendent Ohio state university, 1877-81 ; associate editor *Farm and fireside*, 1881-87 ; director Ohio agricultural experiment station from 1888 to date. Address : Columbus, Ohio.

TRACY, S. M.

Born April 30, 1847, at Hartford, Vermont. Graduated from the Michigan agricultural college in 1868 with degree of B. S. Professor of botany and horticulture, Missouri state university, 1877-87. Now director of Mississippi agricultural experiment station. Has degree of M. S. Address : Agricultural College, Miss.

PUBLICATIONS.

Phænogamic flora of Missouri.

Report of investigation of western grasses. For U. S. dept. of agriculture.

Has written numerous papers on agricultural and scientific subjects.

TRELEASE, WILLIAM.

Educated at Cornell and Harvard universities. Professor of botany at university of Wisconsin till 1887. Since, director Shaw school of botany, St. Louis, Missouri, and consulting botanist Arkansas agricultural experiment station. Address : St. Louis, Mo.

PUBLICATIONS.

Numerous botanical works.

TRESCOT, THOMAS C.

Assistant chemist, United States department of agriculture, engaged in general agricultural analyses, especially nitrogen determination. Address: Washington, D. C.

TROOP, JAMES.

Born March 15, 1853, at Bennington, New York. Educated at home public school. Graduated at Michigan agricultural college in 1878, with degree of B. S., and received M. S. in 1882. From 1881-84 assistant in botany and horticulture at same college. Professor of horticulture and entomology, Purdue university, 1884 to present, and now horticulturist to Purdue university agricultural experiment station. Address: Lafayette, Indiana.

PUBLICATIONS.

Reports and bulletins of horticultural experiments, 1884-88.

TUTTLE, ALBERT H.*

Born in 1844, in Summit Co., Ohio. Graduated at Pennsylvania state college, 1868. Taught from 1868-70 in first state normal school of Wisconsin. Graduate student and instructor in microscopy in Harvard museum of zoölogy under Prof. Agassiz, 1870-72. Travelled and studied in Europe 1872-74. Professor in Ohio state university 1874-88; during one year of this period absent on leave as graduate student in the biological laboratory of Johns Hopkins university. In summer of 1888 elected professor of biology and agriculture at university of Virginia at Charlottesville, Va.

*Abstracted from *Science*, Sept. 14, 1888.

TWOMBLY, S. S.

Born 1858. Graduated at the Maine state college in 1886 with the degree of B. S. Assistant in agricultural chemistry at Cornell university, 1886-87. Now chemist and vice director Arkansas agricultural experiment station. Address: Fayetteville, Ark.

TYLER, C. F.

Graduated at Berea college, Ohio. Assistant in Louisiana sugar station sugar house. Address : Kenner, La.

VOORHEES, E. B.

Born June 22, 1856, at Mine Brook, Somerset county, New Jersey. Attended public schools till 12 years of age. From 1873-'77 assumed management of his father's farm. Graduated from Rutgers college in 1881 with degree of A. B. From September, 1881, till June, 1882, assistant to Prof. W. O. Atwater, of Wesleyan university, aiding in class-room and in chemical work upon the nutritive value of foods, and the sources of nitrogen in plants. Appointed in June, 1882, as first assistant chemist to the New Jersey agricultural experiment station. In 1884 the degree of A. M. was conferred by Rutgers college for work done and thesis presented. Address : New Brunswick, N. J.

WARNER, CLARENCE DUANE.

Born June 16, 1852, at Granby, Mass. Received diploma Salem collegiate institute. Graduated at Mass. agric. college in 1881 with degree of B. S. Studied under Prof. J. J. Sylvester at Johns Hopkins university, 1883-84. Since 1884 has held chair of mathematics and physics at the Mass. agric. college, and since 1888 has acted as meteorologist to the Hatch experiment station of the same college. Address : Amherst, Mass.

PUBLICATIONS.

Published a work on mensuration in 1886.

WEBER, ADOLPH H.

Born September, 9, 1859, at San Francisco, California. Attended public schools of San Francisco, and graduated at the university of California in 1880 with degree of Ph. B. Studied at Freiburg, Saxony, from 1880-84, under Cl. Winkler, Weisbach and Richter, and took degree of metallurgical engineer. Field assistant United States geological survey in summer 1886. Geologist in field of

California state mining bureau from July, 1887, to March, 1888. At present assistant in college of agriculture, university of California. Address : Berkeley, California.

PUBLICATIONS.

Report to the state mineralogist in state mineralogist's seventh report for 1888.

WEED, CLARENCE M.

Born Oct. 5, 1864, at Toledo, Ohio. Attended private German school, and then public school course at Lansing, Mich. Graduated at Mich. agricultural college, 1883, with degree of B. S. Special student and assistant to Prof. A. J. Cook at same institution, and part of time student under Prof. J. H. Comstock, at Cornell university. In 1884 given degree of M. S. by Mich. agr. college. Assistant editor *Prairie farmer*, 1884-85. Entomological assistant at Illinois state laboratory of natural history, under Prof. S. A. Forbes, 1885-88. Entomologist Ohio agr. exp. station, 1888 to date. Entomological editor *Prairie farmer*, 1885-88. In charge of entomological department *Orange Judd farmer*, and *American garden*. Address : Columbus, Ohio.

PUBLICATIONS.

Food of birds, toads and frogs, 1884.

Some new Illinois Microgasters, 1887.

Experiments in preventing curculio injuries to cherries, etc., 1888.

WICKSON, EDWARD J.

Born August 3, 1848, at Rochester, N. Y. Graduated at Hamilton college, 1869, with degree of A. B. In 1872 took A. M. in course. Agricultural editor *Utica morning herald*, 1872-75. President Utica dairymen's board of trade, 1874-75. Secretary New York farmer's club, 1873-1875. Editor *Pacific rural press* (San Francisco) 1876, to date. Lecturer on dairy husbandry in the college of agriculture, university of California, 1878-1885. Secretary California state horticultural society, 1879 to date. Lecturer on practical agriculture and instructor in economic

entomology, university of California, 1885, to date. Assistant superintendent of experimental grounds, university of California, 1886, to date. President San Francisco microscopical society, 1886. Address: Berkeley, California.

PUBLICATIONS.

Contributions to agricultural literature have been chiefly editorial writings for above named journals.

Dairy husbandry, Harper's magazine, Nov. 1875.

Chemistry of feeding, N. Y. state dairymen's ass'n. Rep. 1875.

Science and farming. Illinois dairymen's soc. Rep. 1875.

Synopsis course lectures on dairy husbandry. Rep. college of agriculture, university of California, 1879.

Address at corner stone laying Chaffee college of agriculture, university of southern California, 1883.

Wheat varieties resisting Hessian fly. Bulletin 58, university experiment station (California), Oct. 9, 1886.

Reports on forage plants and cereals. Bulletin 72, university of California, Aug. 12, 1887.

Reports on injurious insects. Report university of California, college of agriculture, 1887.

Arsenical sprays for codlin moth. Bulletin 75, university of California, experiment station, Nov. 19, 1887.

California mission fruits. *Overland monthly*, April, 1888.

The Vacaville fruit district. California view publishing company, 1888.

WHEELER, WILLIAM P.

Born at Syracuse, N. Y. First assistant at the New York agricultural experiment station, and assistant chemist. Address: Geneva, N. Y.

WHITCHER, GEORGE H.

Born Nov. 13, 1860, at Strafford, New Hampshire. Attended Coe's academy at Northwood, N. H., and one term at Pittsfield academy, N. H. Graduated at the New Hampshire agricultural college in 1881. Superintendent New Hampshire agricultural college farm in 1883; instructor in agriculture at same college, 1883-87; professor of agriculture at same 1887 to date. In February, 1888, elected director of the New Hampshire agricultural experiment station, Address: Hanover, N. H.

WHITE, B. O.

Born July 17, 1848. Graduated in the chemical course of the university of Vermont in 1873, with degree of Ph. B. Professor of natural sciences, Dickenson seminary, Williamsport, Pennsylvania, from 1874-76, and same chair at Western college, Iowa, 1876-79. Farmer, Colchester, Vermont, 1879-87. Assistant chemist Vermont agricultural experiment station from March, 1887. Address: Burlington, Vt.

WHITE, H. C.

Born in Baltimore, Maryland, in 1850. Educated in private schools in and near Baltimore, and at the university of Virginia. Has degrees of A. M., B. S., C. E., M. E. and Ph. D. Was professor of chemistry in St. John's college, Annapolis, Md. Science lecturer to Peabody institute, Baltimore. Is now professor of chemistry in the university of Georgia, state chemist to Georgia, and chief chemist to Georgia agricultural experiment station. Address: Athens, Georgia.

WHITNEY, MILTON.

Native of Baltimore, Maryland. Studied agricultural chemistry, physics and allied science for three years at Johns Hopkins university. Appointed assistant in chemical laboratory in Bowdoin college, Maine, and later studied under Prof. W. O. Atwater, at Wesleyan university, and was an assistant in the Connecticut agricultural experiment station. For two years farm superintendent of the North Carolina agricultural experiment station. Since 1888 professor of agriculture in the university of South Carolina, and vice-director South Carolina agricultural experiment station. Address: Columbia, S. C.

WILEY, HARVEY W.

Graduated at Hanover college, 1867, degree A. B., receiving A. M. from same in 1870, and Ph. D. in 1876. Received M. D. degree from Indiana medical college, 1871, and B. S. from Harvard university in 1873. Stud-

ied in Berlin in 1878. Professor of Latin and Greek, Butler university, Indiana, 1868-71; science teacher, Indianapolis high school, 1872; professor of chemistry, Butler university, 1874; professor of chemistry, Indiana medical college, 1874-77; same position, Purdue university, 1874-83; Indiana state chemist, 1881-83; chief chemist United States department of agriculture, 1883 to date. President section C., American assn. for the adv. of sci., 1886; of the chemical society of Washington, 1886, and of the association of official agricultural chemists, 1886. Address: Washington, D. C.

PUBLICATIONS.

An automatic filtering apparatus. *Amer. jour. sci.*, v. p. 350.

The metric system of weights and measures in pharmacy, *Proc. Amer. assn. adv. of sci.*, 1873, pp. 94 et seq.

Apparatus for rapid evaporation, *Proc. A. A. A. S.*, 1876, *Amer. chemist*, October, 1876.

Apparatus for continual extraction with ether or alcohol, *Proc. A. A. A. S.*, 1876.

Analysis of American woods. *Ibid.*

A new form of Goniometer. *Ibid.* 1877.

A new reaction for the detection of hydrochloric acid in presence of hydrobromic and hydroiodic acids. *Amer. chem. jour.*, ii, p. 48., *Chem. news*, xli, p. 176.

Absorption spectrum of uranine. *Amer. chem. jour.*, i, 211.

Analysis of maple saps. *Proc. A. A. A. S.*, 1879.

Rotatory power of glucose and grape sugar, *Ibid.*, 1880, pp. 308.

Influence of acids and bone black on rotatory power of glucose. *Ibid.*, 1880, pp. 320.

Amylose. *Ibid.*, 1881. *Science*, Oct. 1, 1881.

Mixed sugars. *Proc. A. A. A. S.*, 1881.

Relation of reducing power of glucose to its specific rotatory power. *Ibid.*, 1881.

Sugar cane. *Phar. jour. and trans.*, xii, p. 140. *Chem. zeit.*, 1881, p. 856, *J. Ber.d. chem.*, 1881, 984.

Estimation of starch sugar in cane sugar. *Jour. Amer. chem. soc.*, 1880, p. 387.

Adulterations of sugar and sirups. Rep. Indiana state board of health. 1883.

Direct determination of dextrose, dextrine and maltose in glucose and grape sugar. *Chem. news*, xlvi, p. 175; *Dingl. jour.*, cclvii, p. 378; *Chem. zeit.*, vi, p. 1206; Wagner's *Jahr. Ber.*, 1882, p. 692.

Report on glucose. *Nat. acad. science*, p. 19; *Bul. de l'assoc. der chimistes*, ii, p. 201. *Zeit.d. Ver. f. d. Rübenzuckerind. d. Deutch. Reichs.*, Oct., 1884.

American butters and their adulterations. *Proc. A. A. A. S.*, 1883. *Jersey bulletin*, iii, p. 313.

Note sur un procédé pour indiquer la fin de la reaction du glucose avec une solution alcaline de cuivre. *Bull.d. l'assoc. des chimistes*, ii, 1884, p. 108; *Zeit. d. Ver. f. Rübenzuckerind.*, xxi, p. 1151; *Chem. Central. Blatt*, xv, p. 959.

Analyses des cannes á sucre, des cannes á sorgho et des bagasses. *Bull d l' assoc. des chimistes*, ii, p. 154.

Composition of American milks. *Science*, V. p. 130.

Determination of lactose in milk by optical methods. *Amer. chem. jour.*, v, pp. 289 et seq.

Beilstein. *Organische Chemie*, p.847.

Composition of maple sugar and sirups, and their adulterations. *Chem. news*, li, 1317, pp. 88+.

Honey and its adulterations. *Amer. apicul.*, iii, 12, 1885.

Estimation of acetic acid in liquids containing organic matter by distillation. *Chem. news*, liv, p. 34, *Chem. Central-Blatt*, xvii, p. 844.

Kumys. *Amer. chem. jour.*, viii, p. 200.

Economical aspects of agricultural chemistry. *Proc. A. A. A. S.*, 1886.

Melting point of fats. *Ibid.*; *Jour. Anal. chem.*, I, No. 1.

Areometric method of estimating fats in milk. *Ibid.*

Inaugural address president association of official agricultural chemists. *Bull. 12, chem. div. U. S. dept. agr.*, Sept. 1886.

Unexplained noises. *Science*, Oct. 15, 1886.

Annual presidential address of the chemical society of Washington. "Our sugar supply." Dec., 1886.

Bulletins of chemical division, U. S. dept. of agr., Nos. 2, 3, 5, 6, 8, 13, 14, 17, 18.

Report on methods of analysis of dairy products. *Bull. 16, chem. div. U. S. dep. agr.*

Report on analyses of potash. *Ibid.*, No. 7.

Sorghum as a sugar producing plant. *Proc. 8th meeting soc. prom. agr. sci.*, pp. 82+.

Sorghum, its success and value. Address before the agricultural society of Indiana. *Proceedings*, 1883.

The spirit of scientific progress. Address at 16th commencement Indiana med. coll., Feb. 27, 1885.

On the causes of variation in the content of sucrose in sorghum. *Botanical gazette*, March, 1887.

The use of phosphorus contained in iron ores as a fertilizer. *Agricultural science*, 1, 3, pp. 49+.

The refractive index of oils. Washington chemical society. March meeting, 1888. *Jour. analy. chem.*, II, No. 3.

Bechi's test for cotton seed oil. Wash. chem. soc., March meeting, 1888. *Jour. chem. soc.*, II, No. 3.

Note on the action of the digestive fluids on cotton seed oil. Wash. chem. soc., March meeting, 1888.

The value of the iodine number in sorting lards. *Ibid.*, April meeting.

Sweet cassava (*Jatropha manihot*, or Aïpi. *Agricultural science*, ii, p. 256+.

WILKINSON, L. W.

Born March 6, 1860, in Barbour county, Alabama. Lived on a farm near Ozark, Ala. Common school education till 20 years of age. Then taught district schools two years. Prepared for college at Clifton high school, Dale county, Ala. Graduated from Alabama agricultural and mechanical college in 1886, with degree of B. S. Received degree of M. S. on completing post graduate course in 1888. Second assistant chemist at Alabama agricultural experiment station. Address: Auburn, Ala.

WILLITS, EDWIN.

Native of New York, but moved to Michigan in 1836. Graduated from university of Michigan in 1855. Has held various political positions in the state, in the meanwhile practicing law. From 1883-85, principal state normal school; since 1885, president Michigan agricultural college. In 1888 elected director of Mich. agr. exp. station. Address: Agricultural College, Mich.

WIPPRECHT, WALTER.

Born Jan. 3, 1864, at Sisterdale, Kendall county, Texas. Graduated from Texas agricultural and mechanical college in 1884 with no degree, but as post graduate in 1885 secured B. S. A. Studied chemistry at university of Jena, Germany, 1887-88. Assistant in chemistry, Texas agricultural and mechanical college, 1885-86. Now holds similar position in Texas agricultural experiment station. Address: College Station, Texas.

WITHERS, WILLIAM ALPHONSO.

Born May 31, 1864. Graduated from Davidson college, North Carolina, in 1883, with degree of A. B., receiving A. M. in 1885. From January, 1884, to date, assistant chemist (promoted from fourth to second) at the North Carolina agricultural experiment station. Address: Raleigh, N. C.

WOLL, F. W. A.

Born May 23, 1865, at Bergen, Norway. Received B. S. from state university of Norway, in 1882, and Ph. B. in 1883. Studied general analytical and synthetical chemistry at same university, 1882-85. Came to America in fall of 1885, and took a post-graduate course at the university of Wisconsin, 1885-86, receiving M. S. degree in 1886 for special studies in agricultural chemistry. Since 1886 second assistant chemist at the agricultural experiment station of the university of Wisconsin.

PUBLICATIONS.

Various contributions to local and other agricultural papers and periodicals. Eusilage vs. corn fodder for milk production. *Agricultural science*, II, pp. 183-211 and 219-34.

WOOD, A. H.

Graduated at the New Hampshire agricultural and mechanical college in 1885. Foreman N. H. agr. college farm one year. Now supt. of dairy at New Hampshire agricultural experiment station. Address: Hanover, N. H.

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